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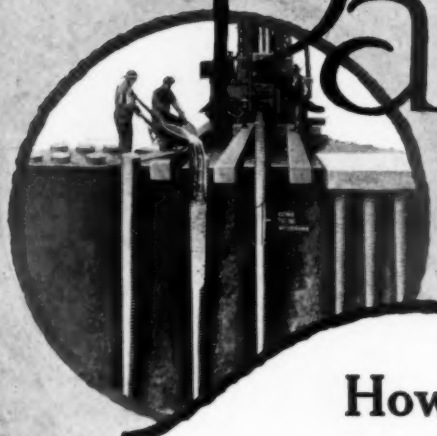
Raymond



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THE AMERICAN ARCHITECT

VOL. CXIV WEDNESDAY, SEPTEMBER 18, 1918 NUMBER 2230

The Romance of Roofing Slate

Part II

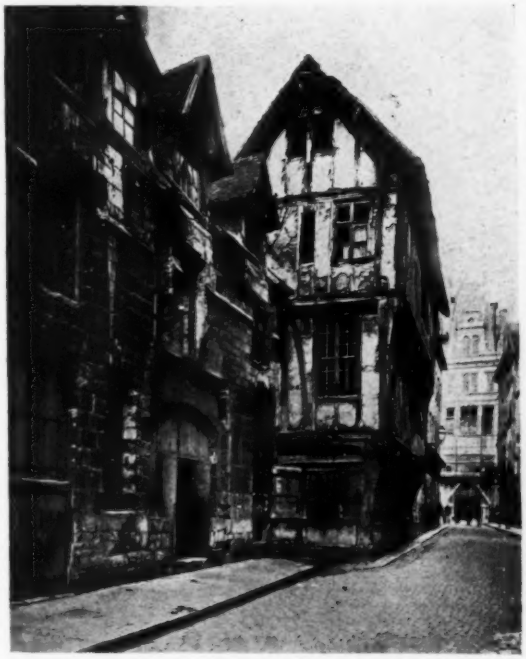
By HOWARD BLAINE BURTON, B. ARCH.

MANY things have contributed toward the failure of architects to realize the many possibilities in the use of heavy slate. A certain so-called conservatism has been exercised in the use of slate, just as the skyscraper was a plan-factory job until Cass Gilbert invented an American style of applying common sense to things as they are.

Many have preferred to work in heavy slate as produced by the manufacturers arranging them in mathematical descending order, instead of making them living things by the same quality of study to the roof as to architectural detail. Others have seemingly considered graduated slate as an affectation and continue to work in slate of a single kind and size which they defend as the natural use of the material, although they are using slate in the most artificial manner it can be produced. A few hours at the commercial quarries are sufficient to see how all grades, all colors, all sizes, are constantly being produced with the whole aim to make the product as artificial as possible. In fact, when a workman's product varies from another's so much as to be distinguished he is immediately discharged as incompetent.

Not every one who tries heavy slate, naturally, can make a masterpiece of each effort. In fact, in architecture as in everything else, progress is the summation of a great bunch of efforts, most of them in some direction other than the right one.

Roofing slate offers a veritable playground for architects, both the venturesome kind and the conservative element as well. The manufacturers have scarcely scratched the surface in offerings of architectural slate but there are enough now to do some very clever things with if one escapes the pitfalls. Like the violin, slate is a very easy medium to get something out of and very difficult to master. Both, too, can emit rasping discords. Being but one instrument in the architectural orchestra, the slate roof must not only play its part with proper accent and subordination but must observe the "rests" as well.



MAISON VIEILLE, ROUEN (1520)

The modest, simple building in the chamber music class does not call for cymbals and trumpets. A heavy roof of marked graduation would be out of place. Slate can be chosen with taste even from the "stock" sizes. The pitch of the roof alone excludes slate when it becomes too flat, say 25 degrees, and this is not the limit if false construction is resorted to, like the inner and outer dome which we never question. A frame construction or ex-

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THE AMERICAN ARCHITECT

Note the similarity of composition between this view of the Duncan house and the old house in Rouen. Even the roofing material could be interchangeable

JOHN RUSSELL POPE, *ARCHITECT*

terior does not forbid slate on the grounds of its being stone, for slate isn't. Stone is never 3/16 inch thick. If slate must not be used above wood, then plaster, every ingredient of which except the hair is stone, is wrongly used over wood wainscots, on ceilings or in any room not having a stone floor.

As to precedent there are numerous buildings in and around Boston, Washington and Baltimore dating before 1800 roofed to this day with Welsh slate brought over as ballast. Nor was it always economy or a local expediency for the Congregational Church at Hartford, Conn., up to last year bore a slate roof laid 1806 after being hauled two hundred miles by ox teams. Moreover, to those who feel thick slate is necessarily stone, the above slate was from 3/8 to 1/2 inch thick.

However if the building is light, thin slate is safest and in the smallest sizes even the cold colors of the unfading slates become sociable.

In heavy slate, which the trade defines as slate thicker than 3/16 inch, the possible effects extend from a simple wood shingle suggestion to heavy manor house stone roofs. Divided along another line the effects range from good to the bizarre. The shingle idea, using slates from 1/4" to 3/8" thick, is good for much architecture and is inexpensive, but it requires a high degree of skill to be successful; skill not only in superintendence, but the slate should properly be specially made back in the quarries and for this reason only concerns having the facilities and experience should be trusted with such a commission. Neither will breaking off the corners of regular slate and laying it crooked save such a roof from the verdict long since rendered against the stucco gable with broken glass imbedded in it. Such effects, returning to the musical figure, are merely traps, "slap-sticks" and "crash boxes" of the cheap movie orchestra, and they please the same crowd. Successfully handled, the "shingle effect" is delightful. It has all the interest and value of weathered hand rived shingles yet does not imitate them.

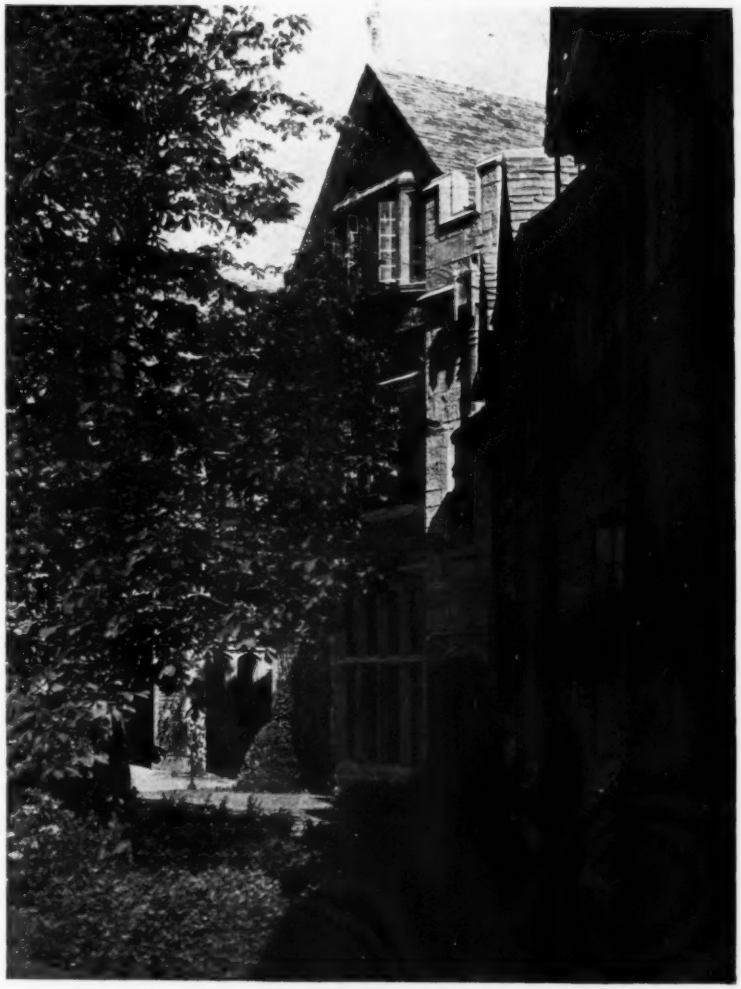
Heavy graduated slate is far too broad and complex to more than touch upon in this article.

It consists properly of the use of more than one *thickness* as well as several lengths on one roof surface and far from being an affectation is the original and most economical use of slate. Were it not for the extraordinary cleavage properties of modern slate, graduated slate would yet be the prevailing type as it was in the early days.

In those days for economy strictly, all sizes,

thicknesses and shapes made up each "order." It was sold too by the ton and delivered from a cart as common brick is dumped out. The roofer's work began with sorting the stuff out, all the big pieces to go in the first row over the bearing walls and retaining the small thin ones for farther up the rafter. All of a given length went in the same row as far as possible and frequently there were too many or not enough and the "graduation" was affected thereby. Just how far we should imitate such accidents is a matter of opinion and individual architecture to decide, but there is much to commend these fancies if well handled. In fact is there not an inconsistency in going to Venice for inspiration, to the quarries of Angers for material and to Local No. 411 for our workmanship?

As yet the effects secured in antique reproduction are admittedly the result of patient, intensive, persuasive superintendence. Few roofing concerns have essayed specializing this work, but lacking technical training their assistance is mainly of an avoiding-the-negative-character and the securing of architectural refinement will for a long time yet be up to the architecturally trained alone. In the olden days the roofer was a true craftsman and practically architect of his work. Generations of skill and pride gave him ability and the slaters guild ranking high in the stone roof districts preserved to the craft its secrets. While rules inevitably spring up, the material, being rough and from the immediate vicinity as well, was spared the horrible results of modern trade customs, largely perhaps because their rules were all based on practical necessities rather than on labor expediencies. The unscientific variety in the material favored indefinite names and to this day slate in Wales takes the Royal family designations beginning with *kings, queens* and so on, through *dukes, duchesses,* downward. In parts of England the names are part of the quaint speech still met in certain sections, seemingly a hangover from Chaucer's time. An illustration will suffice. At the eaves it was the custom to give the first slate a flatter pitch or "kick-out" to throw the water farther from the walls. This necessitated a shorter slate but thick and heavy. It was called a "Cussome".



"Bottomers" and "lie-bys," "skews" and no metal. These valleys were laid, not by a Cotswold craftsman but by a Swede roofer with some close architectural supervision

JOHN RUSSELL POPE, *ARCHITECT*

In the regular roof the terms "long" and "shorts" applied to the width as we know it. The many sizes in the variable thickness of each size received

Detail of modern slate in antique effects

each their special name such as "bachelors," "becks," "vivetts," "moveadays," "cuttings," at the ridge there were "long cocks" and "short cocks."

The "rounded" valley of modern work, so fascinating to attack but so hard to accomplish successfully, was easily handled by the roofers of the sixteenth and seventeenth centuries merely by using a "bottomer" flanked by two "lie-bys," and a pair of "skews" in alternate courses. No metal was used as was also the case of the valleys of the Duncan Residence pictured herewith.

In both France and England the design element of slate was further effected by great economy.

Slate is perfectly at home on the frame building, but must be in good scale and is best dark in value
HOWARD BLAINE BURTON, *ARCHITECT*

The full-size sample is expensive, and even on the roof requires an untrammeled imagination

The practical and self-flashed 3" head lap under the *second* course above is almost modern. In both countries the slate was hung over roof strips by oak or deal pegs driven tightly into roughly cut holes, one near the end of each slate. In England to prevent further leakage the slate roof was plastered up below and occasionally pointed on top as well. In France they had a clever and very economical method of laying slate, nothing at all like the "French method" of asbestos shingles association, which required trimming on but two sides only, and which enabled even the small fragments of the quarry or broken on the job to be used up.

The shingle effect in slate

Such roofs are coursed not horizontallly but at a long angle. They rather offend the modern eye and their interest is more archaic than inspiring, although a proper architecture might easily be completed by such a roof.

A study of the old work confirms the belief that the graduation was a practical necessity the build-

ers would have preferred to avoid. There is little evidence that they wished to feature it, but merely did their best with a practical obstacle. Since only a tremendous commercial production enables us to *avoid* the graduated roof to-day we have equally good basic architectural logic for using it, and this aside from intrinsic matters of color play, perspective, texture and interest.

In working in graduated slate it is apparent the avoidance of extremity of sizes is indicated by precedent and good taste.

The havoc played with varying colors when large slates are used is another reason against them. Ex-

The zenith of roof craftsmanship was reached during the English Tudor period

aggerated range of thickness is in the same class and although having a favoring tendency to the slate colors it savors of ostentation. Neither large sizes nor thicknesses can be successfully carried on any but heavy supporting walls. Furthermore, a study of the old work shows the very heavy roof much less used than that of moderate weight and the extreme range of graduation used so much here was almost never used on a shingle roof. There is no precedent whatever for the monstrous "Joseph's coat" affair running from tombstones to beadwork with the regularity of contour lines on a government survey, and smoothing itself around valleys and dormers as if backed with burlap the way bathroom tile comes. Except that the first of such roofs was original, they suggest too strongly the slide rule, and 6H pencil to secure an architectural rating. Fortunately they cost so much they did not become common before better taste prevailed.

The manufacturers of American roofing slate have scarcely started mining the rarer colors and many more known are not yet exploited. For antique reproduction it is a subject on which the diversity of opinion could not be greater. The views of leading architects scarcely classify themselves. The storm center was and even yet is around a country house in the Tudor style, a long rambling composition in a miniature English setting. The house had very close watching during its construction and persons who have viewed it are astonished in the texture in its brickwork, timbering, gables, leaderheads and stonework visible as far as they can be seen, yet which do not become brutal, coarse and repellant when one walks upon the terrace and through the arched portal. There is not the slightest trace of the vaudeville on the one hand or the union rules on the other anywhere. It is as satisfying a piece of architecture as one seldom sees for there is very little wrong about either it or its setting; its composition or detail; its conception or handling. Its roof, too, carries out the same spirit and in spite of being the first successful attempt at reproducing old slate in this country it still remains one of the very best examples.

Being a playground, there are also pitfalls in the use of slate, but after one or two experiences one will not attempt to judge in a dark office colors which will be later seen under a hemisphere of pure sunlight. One in time will learn the profound modification of color due to texture. That texture is nothing after all but shadows, and shadows will make a roof warm while introducing purple makes it cold; that some purples are cold and some are warm; that purples from two separate quarries are as hard to use together on one roof as are two reds in the decoration of a single room; that quarry nomenclature cannot be translated into architectural terms and vice versa, that the terms, *rough, smooth, unfading, fading, heavy, dark, light, green, gray, black,* etc., have meanings to the salesman and quarry workers utterly foreign to those of the architect, because the quarryman has lived on the other side of a mountain for generations and speaks his own dialect. Errors due to lack of an interpreter can be corrected by engaging one, or by experience. Nobody knows it all, so a certain amount of individuality will mark the work of even the most successful and the best guided. Besides such a roof becomes at once architectural and evasive, like the "Ideal Solution" of student days. This is where the playground figure comes in.

A Government Individual Home Building Corporation

By C. E. SCHERMERHORN, *Architect*

THE "Own-your-home" movement is making rapid strides throughout the country and promises that the term will be more than a mere slogan; also that the seriousness of the present housing problem is hardly comprehended and the necessity of obtaining a solution for prompt relief is one of the paramount questions of the day.

Some remedy must become manifest in the immediate future for the practical solution of this vexing and important problem, as the expansion and gradual development of Government housing projects is only partially answering the exigencies of war-time conditions. It is essential that some provision be made for an immense increase in the number of new homes, if we are to reach the highest degree of efficiency and good morale in the work of the country.

The stimulation of ordinary residential building will be an impetus to labor, and with their wages at the present time more than adequate for their accustomed way of life, an outlet for this additional money must be provided. No solution could be created that would reflect more benefit to the nation than to enable the worker to possess or own an equity in a home; as the possession of a permanent residence fosters an increased community spirit and more serious consideration of the duties of citizenship.

The need for housing in congested districts is being cared for by the Federal authorities, but there is still a war-time necessity other than the mere housing groups, namely, to encourage, assist and enable all war-workers in every section of the country to own homes by providing them with the proper data, information and essential funds.

How best to house our workingmen and their families is not solely a material question; it has its emotional and sentimental side and the secret of industrial harmony is contentment.

We have been inclined to expect the immigrant to love America when he knew as America only the unwholesome hidden part of a crowded city, a dismal and faded replica of the old home he had left. He has little chance to enter American community life, to appreciate the democratic institution or be influenced by a real home, so naturally his interests in American ideals and projects are correspondingly deficient, and oftentimes he is discontented, uninterested and unsympathetic with the interests of the nation. The Americanization of the immigrant cannot be accomplished by charitable or secular groups. This problem, of such national significance, should be undertaken by our Government in encouraging and providing proper means for them to obtain and own living accommodations with proper surroundings.

Ex-President Roosevelt recently remarked: "But little attention seems to have been paid to the decline in owned houses, an aspect of our social life which is no less serious in its import, and unconsciously we seem to be on the verge of a complete surrender of the political ideal which gave the United States its position among nations, for it is a recognized fact that house ownership is the backbone of any sound national structure."

Something must be done to stimulate the construction of homes, as it has a vital bearing upon the efficiency of labor employed in war industries. England has had the same experience that this country is now facing, and the London *Economist* in a recent issue states that "it will be necessary to make provision after the war for an estimated shortage of 500,000 houses."

Now, what are we to do?

The question as to whether the Government should provide funds for houses in which our war-workers are to live is about as debatable as whether it should build ships or conscript men. Senator Morris Sheppard of Texas in a recent speech in the United States Senate pointed to the fact that "almost every country of importance, other than America, has taken definite legislative steps to enable the people to acquire and maintain homes and nearly all the leading nations have constructive land purchase and land settlement policies by which the Government aids the masses in securing homes."

Through a special department, under the control and direction of the United States Housing Corporation of the Department of Labor, it would be thoroughly practical to have carefully studied and prepared working drawings of standardized houses. Single-family, self-contained, detached, two, three and four bedroom types, somewhat varied in design, should be developed and made in sufficient series to cover structural requirements for building with stone, brick, concrete, hollow-tile, or frame.

To each design there should be appended an exhaustive itemized list of the required sizes, quantities and grade of the various materials essential, so that there would be no occasion for confusion in ordering adequate quantities; there should also be provided clear and concise specifications and instructions for every branch of labor, materials and finish necessary to complete the building; there could also be added a list of representative firms who manufacture and furnish standard stock types of doors, sashes, trim, hardware, plumbing supplies, lighting fixtures, various types of heating apparatus, etc. There should also be prepared a brochure concerning the grading of lot, aspect of rooms, drainage, water supply, walks, color combinations for painting, etc.

The drawings, specifications and instructions could be distributed to contemplative home builders who, possessing or about to purchase a lot, would apply for and answer a questionnaire pertaining to such essential facts as local conditions of site, water supply, drainage, environment, compass points, distance from railroad station, trolley, school, etc.; also sex and vocation of applicant, his original nationality, family, dependents, distance from and character of employment.

It could be arranged to have this Government Corporation finance each individual project, and, although entailing considerable detail, the character of available man material has never been lacking in our country, and when the benefit to cause, country and citizens is considered, a practical organization will readily be formed.

Inasmuch as the resources of the average workman are limited, the prime factor in building these single detached homes is to limit the cost of construction in every way practicable to supply the workmen's needs and at the same time furnish sufficient for his comfort and happiness at a price well within his means. As it is not within the average workman's power to furnish capital with which to purchase a home outright, we must solve this economic problem by studying the many experiments which have been made by manufacturing interests to furnish their employees with homes on a part payment basis.

A corporation under Government control could be formulated, for no matter whether the building of homes for workmen is prompted by philanthropy or for financial gain, the building of each house adds just one more to our growing army of home owners and tends to inspire thrift, comfort and independence—the root of genuine Americanism.

This United States house-building corporation could be formed and placed in a position to buy or contract for all required structural and finishing materials, all fixtures and appliances in large quantities, and to direct intelligently their distribution from various sections in the country. In fact, in many cases it would be quite possible to send everything for one house in several cars, direct to the community in which a house is to be constructed, in this manner eliminating possibilities of freight congestion and long hauls, yet still retaining a firm hold on the question of essential embargoes and non-essential construction.

An American citizen owning a lot clear of encumbrances, who agrees to remain on war-work for the duration of this war, would be entitled to make application for a loan on the type of house to be determined upon as best suited to his needs and funds, the United States Corporation guaranteeing payment and releasing materials to the properly and adequately bonded subscriber, provided that he shall fully comply with terms of his contract and the plans and specifications; when the house is completed the corporation would have a rigid inspection made and, when work is approved, put into effect the required schedule of monthly payments, after the creation of the long term, low rate mortgages with accompanying bonds.

The payment being made monthly, in shape of a fixed amount to a saving or mortgage reduction fund (also interest on mortgages, taxes, water rent and insurance), provides an easy means for the owner to liquidate his obligation and encourages the making of additional obligation reduction payments from time to time to save interest charges. It also affords an avenue for the liquidation of Liberty Bonds as they mature, or may be called, for these home buyers are certain to possess one or more of each series.

Through this corporation it ought to be possible to effect substantial economies by co-operation; in other words to develop a large wholesale business, with carefully worked out standardized plans, limited to a few varieties and sound, practical construction. One of the reasons for present high costs is the want of adequate capital to set in motion the construction of homes of the right sort and in number exceeding anything we have known heretofore. There are thousands of workers who own or are paying for lots on installments, who are desirous of building a home, but lack the opportunity for want of proper advice as to methods of construction and a clear knowledge of how to proceed or where to obtain the essential additional loan of funds beyond the equity they can offer.

When one considers that the number of families added to the population of the United States each year is about one-half million, and that to supply them with new houses (not considering fire losses

and depreciation) would cost at least one billion dollars, he begins to visualize the urgent necessity for Government aid in this matter; our big business interests will not respond as housing only offers moderate profits, so let the capital come in the elimination of profits and speculation; from the wage-earners themselves—from our Government.

This Government controlled housing corporation would be enabled to commandeer adequate sites, economically develop tracts, place the street improvements, etc.; and the benefiting local manufacturers could readily be induced to bear the cost of recreation centers for a well-housed, stabilized, home-owning working force, whose only initiation fee, under this Utopian plan, would be to pay the actual cost of the lot he may select to purchase.

A question has arisen as to whether labor unions would interfere with the purchase of homes by workmen because such ownership renders labor less flexible, but if the subject is carefully analyzed it would be realized that in most industrial centers available housing has been used up, the units of manufacturing are not singular and a man is not dependent upon one job for a living, and, besides, organized labor is a solid structure which always has supported the Government, and if otherwise inclined could not overcome the home-owning instincts born in every man. What labor wants and is entitled to is a comfortable living, sure pay, educational and community facilities.

Factory Conditions as Affecting Unstability of Labor

The conditions of war workers in factories will be studied by the United States Employment Service in an effort to solve the labor turnover which, according to the Employment Service, has assumed such large proportions as to endanger the volume of production. Representatives of the service and an expert in industrial management will visit one of the largest war plants of the country which has suffered from excessive turnover, and make a study of the internal conditions of the plant, in order that measures may be taken to keep the men at work. The plant at present is requiring 2000 unskilled workers a week, owing to the constant change and leaving of men.

The establishment of the Employment Service has checked the rushing of workers from one plant to another by private recruiting agents, and has reduced the labor turnover to a large extent. The Employment Service believes that a further reduction of the turnover may be made by studying the internal conditions of the plants, for the purpose of removing conditions that cause the men to leave their work after a few days or weeks.—*Engineering News-Record.*

The Thinking Habit Should be Wedded to the Doing Habit

There are more than a thousand trade, business, professional and other "class periodicals" in America, not to mention thousands of books that summarize much that has appeared in these periodicals. In spite of the vast volume of educational matter thus produced annually, our general increase in economic efficiency is disappointingly slow. Years after improved methods of doing things have been given wide publicity, the older and less effective methods remain in general use. And this is true even where the new methods are so simple as to be readily understood, and where they can be put into effect with little or no capital expenditure. Then why this prevalent inertia in a nation as intelligent as ours?

The answer here, as in similar problems, is to be found by a study of the principles of psychology; and in this case we must study the psychology of habit. Our schools, not excepting most of our colleges, are at fault in that they give little attention to the formation of the habit of following up a reasoned conclusion by a physical action. We are trained to understand rather than to apply our understanding. Boys, for example, learn the "principle of the lever" in their high school physics, and are taught how to solve certain problems by its aid. But they are not trained to apply the principle again and again in a great variety of practical ways. So, although they may form the habit of thinking mechanically, they are not grounded also in the habit of applying mechanical laws and principles.

We are now referring not merely to the general lack of manual training in our schools, for that is but one phase of a wider matter. Our point is that students should be trained invariably to take some sort of action that will give immediate application to the conclusions that they have reached as a result of their studies. America is full of inventors who get no further than to make a few sketches of their ideas, and who raise a cry of priority when someone else goes further and makes the real physical device that their sketches forecast. Every village has its clever and sound reasoners who are habituated only to reason and not to act upon their conclusions. It is often a puzzle why these thinkers "get nowhere," when it is evident that all progress is due to thinking. But the puzzle is solved the moment it is realized that most thinkers are not doers.—*Engineering and Contracting.*

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Mr. Nimmons' Letter

IF the question is asked, "What are the major things which have caused present conditions in the field of architectural practice?" it could be conclusively answered by reference to the admirable communication from George C. Nimmons, printed on another page in this issue. Mr. Nimmons presents the case exactly as it is, and from the experience gained by long years of successful practice, speaks with an authority which cannot be questioned.

There can be no doubt that the majority of men in the profession of architecture who have carefully considered the existing state of architectural practice will, in the main, concur with the views set forth in this letter.

Combining the matters presented in the article which Mr. Nimmons analyzes with his own communication, there is laid down a platform which if vigorously acted upon will set the situation on the straight road to satisfactory betterment.

At a time when the whole nation is aflame with an earnest purpose, is it not to be hoped that a spark may set afire the fabric of our architectural bodies, arousing them to prompt and vigorous action, or has the collapse of these bodies become so complete that there is no possibility of any quickening which will assist the practice of architecture to retain its proper station among the professions?

The Architect and Post-War Conditions

IN early days of 1916 the Navy Department requested the American Societies of Civil Engineers and of Mechanical Engineers, the American Institutes of Mining Engineers and of Electrical Engineers and the American Chemical Society to make a survey of the industries in the United States that could be of service in time of war. Each of these organizations appointed a member in each state, the five to act as a state committee, and through these several committees the survey was made. In addition to this service many engineering organizations aided in promoting the summer training camps for officers that were so well attended in 1916 and in recruiting militia regiments of engineers in several of the states.

When this country declared war in 1917 the War and Navy Departments, whose officers are trained engineers in some branch, naturally turned to the engineer to conduct the construction activities of war. In this work the architect was overlooked simply because he was so organized, if at all, that he made no impression at Washington as being of particular value or service.

There is no disputing the fact that the American engineer fulfilled all the requirements that were demanded of him. As a result he is in high favor today with the Government and enjoys a large measure of popular esteem.

At the first fall meeting of the American Society of Civil Engineers held in New York, Sept. 4, 1918, the opinion was unanimously expressed by vote that the Board of Direction should appoint a committee to act on post-war conditions affecting the country and the engineers. They will do so and the engineers will act undoubtedly for the best interests of the country and at the same time in a way that will retain for themselves the dominating position they hold in governmental and public regard.

All classes of men are weighed and measured by the public according to their desserts and are forced to stand by the verdict.

There are some vague rumors that an architectural organization is contemplating reconstructing its association or the appointment of a committee on reconstruction in order to be better able to meet post-war conditions than they were the ante-war conditions and the war conditions in which they so signally failed. Instead of rumors there should be actualities *now* and a strong and well-conceived plan should be in operation to place the architect in that position of leadership and confidence with the Government and the public to which he is rightfully entitled.

A Daily Duty

EACH day every American soldier in France is confronted by a great duty. Our Army there has a great task to perform for our country, for the world, for civilization, and for humanity. Our soldiers are doing their duty with a courage and fidelity and efficiency that thrill every heart.

Each day every American citizen at home is confronted by a great duty, a duty as imperative upon him or her as the duty of our soldiers is upon them. The American people have a great task to perform. It is to support to the limit of their ability our Army, our Navy, our country at war.

To work with increased energy and efficiency so that our national production may be increased; to economize in consumption so that more material and labor and transportation may be left free for the uses of the Government; and with the resultant savings to support the Government financially is the daily duty of every American. It is a duty that will be met by every American whose heart is with our soldiers in France, who glories in their courage and fighting ability and their success.

Education After the War

THE Bureau of Education at Washington has recently completed a survey of educational conditions as now existing in other warring countries. The profound and far-reaching effects of war upon education in this country and among our allies cannot at this time be fully estimated, and it is the opinion of specialists who have been studying these matters that a prolongation of hostilities may not only accentuate evils hitherto successfully combated but may also develop situations for which there are no precedents. The general lines and the tendencies of the present upheaval may be studied now with comparative ease. Many important facts are developed in all of the countries under investigation that bear a striking similarity, and this universality, as is pointed out in the survey, gives them an added significance.

For example, it is plainly to be seen that such damage as has occurred to educational systems in the warring countries has been merely material and quantitative. As a result of the war school buildings have been destroyed or commandeered, teachers have been drafted, and among the universities and higher educational institutions there has been a loss in the regular enrollment in some instances as high as 75 per cent.

In addition to this loss, war industries have claimed thousands of older students necessarily disturbing or postponing their educational courses, if not in many instances permanently ending them.

One fact stands out, however, and that is, that interest in public education has nowhere been weakened, nor has there been any lowering in the standard of instruction. The report of the Bureau of Education emphasizes the fact that Europe has never been so alive to the supreme social importance of education as at present. The investigation discloses that France and England are engaged in a simultaneous reorganization of their respective systems of public education and that the continuation school projects now pending in Paris and London are essentially identical, in that they both introduce universal compulsory continuation schools of general and vocational character.

In all of the warring countries extensive plans for educational reconstruction and reforms at the close of the war are under consideration, and it is noticeable that many features of striking similarity are to be found in all of them.

Criticism and Comment

The Editors, THE AMERICAN ARCHITECT:

With reference to the article entitled, "What Constitutes Unprofessional Practice in Architecture?" which appeared in the Aug. 14th number of your paper, permit me to submit the following:

On account of the present condition of architectural practice, and particularly because of the failure of architects to take the leading part in the great constructional work of the war, I am convinced that something is radically wrong and that it is most desirable to discuss the matter at this time.

The article deals with the questions of soliciting work, advertising, guaranteeing a contract, accepting a contract for carrying out work and unauthorized competitions.

The code of ethics of the American Institute of Architects has to me always represented a fine, dignified set of principles, perfectly proper and none too good for the profession which it represents. My experience, however, as well as the recent experience of the profession, has gradually led me to the conviction that this code does not properly take into account the conditions of the times under which we are obliged to work, nor do I believe that the average architect practising under the limitations of the old code can secure adequate recognition. Further, it is conceded that the architectural profession under present conditions fails to secure a large part of the building and construction work which rightfully belongs to it. I therefore believe that the architects, either through their organizations or otherwise, should earnestly try to formulate some specific remedies to correct these defects. It is easy enough to theorize and express generalities on the subject, but what is particularly needed is to determine, if possible, some definite measures to be taken which will improve the present condition of affairs for architects.

In this article attention is directed to the five specific questions concerning which there is most likely to be a change. As to soliciting work, whether an architect may like to do this or not, I believe that it is absolutely essential that he shall do it, in order to secure the work which belongs to him. I believe that a great many architects (and I know of many prominent ones) do solicit work and have always done so. I am convinced that a great deal of work which architects have done would never have been secured by them unless they had solicited it, and I also know that without solicitation from architects a great deal of such work would have fallen into the hands of building or engineering concerns who make a systematic business of soliciting work.

The American Institute of Architects has already removed the restriction against advertising. I believe that it has been very generally accepted that architects should from now on place their names upon buildings during the process of construction. I also expect to see many architects advertising. I know that there is no end to the work which architects could secure by judicious advertising, and if dignified, scientific and businesslike advertising will secure for the profession much of the work which it now loses, I do not believe anything should thwart architects from doing so. I further believe that if architects undertake to advertise an effort should be made to control and direct it so that it would be most effective.

As to guaranteeing a contract, I believe this is a most undesirable feature to introduce into practice. It would, in the first place, make no end of trouble for the architects, as many clients would undertake to hold the architect responsible for defects, irregularities or objectionable features in the work of the contractors, over which the architect had no control. The architects would have difficulty collecting their fees from many clients if any item guaranteeing the work were included in the architect's agreement. In my opinion this could not properly be done at all unless the architect actually executed the work as contractor as well as architect. This brings up your next question of entering into a contract for actually doing the work under consideration. This would combine the work now done by the building contractor with that of the architect. Such a proposition to me has great possibilities and deserves serious consideration. Under

present conditions the architect is absolutely cut off from intimate contact with his work. Curiously enough, he has little or no direct dealings with the craftsmen who execute his designs, and the worst of it is that the master builder or the head contractor is placed in a position in relation to the architect which is the very opposite of what it should be to secure the ideal results for architecture.

Our system of letting the work by competitive bidding and then placing the contractor in a position where his profit depends largely on doing as little as the contract will allow for the finer execution of the work is a vicious system that has always resulted in making impossible that sympathetic co-operation between the architect, the master builder and the craftsman which must exist in order to secure the best results in the work. An architectural firm, with an architect at the head, a master builder and all his assistants, including a competent force of skilled craftsmen to carry out sympathetically all the details of the work, would make an organization which it must be admitted would undoubtedly be far superior in every way to the organization it is at present necessary to gather together for every architectural problem undertaken.

Under the present system the architect is too far removed from the actual work of his building. He is, in a sense, a long distance controller of it. Then there are the few architects who simply make arrangement plans or studies with sketches to determine the architectural treatment of the exterior and impose the making of the real structural and working drawings on the contractors.

These are the men who really do not earn their fees, and, worst of all, they are the ones who have in recent years done the profession the greatest harm. They have made it possible by neglecting to perform their full duties for the engineering and building firms to convince thousands of clients that architects are not essential on any work, except that which is highly ornamental. Consequently, the largest and most important work of our time, the industrial, manufacturing and much of the commercial work, has in many instances not been done by the architects at all, in spite of the fact that they are the men best qualified to do it, and particularly on account of the nature of their profession they are the ones who could most help the manufacturers and business men to develop and improve the commercial and manufacturing industries of this country.

These are, doubtless, in the opinion of some, very frank and perhaps drastic statements, and the measures discussed above may appear almost like architectural heresy. Yet the present situation appears to the writer to be so serious as at least to justify the consideration of radical changes which will restore the architectural profession to the position it deserves.

Chicago. GEORGE C. NIMMONS.

Can Construction Cost be Lowered?

Believing that the high cost of all construction work justifies the query, Can Construction Costs Be Lowered, the editor of the *Monthly Bulletin* of the Illinois Society of Architects, sent out a letter of inquiry to a number of prominent architects practicing in the State of Illinois. A number of replies are printed in the August issue of the *Bulletin* and present an interesting series of opinions on this important question.

In a communication from Herbert E. Hewitt, the subject has been discussed very ably, and his presentation of the subject is of much interest. He writes:

Your letter requesting an answer to the conundrum propounded therein reached me just as I was leaving for my vacation. On first reading, I was inclined to say that it cannot be done. Since I have had time for thought one method occurs to me—there may be others.

The idea that I have in mind concerns the letting of contracts. While it applies more particularly to present conditions, it seems to me good under any conditions. Anyone who has tried to let general contract on competitive bids under present conditions knows that it is practically impossible to do so and that it is even less desirable. Two methods then remain. First: Letting separate contracts for each branch of the work on a unit price basis. Second: Letting a general contract for the entire work on cost plus percentage basis. My own experience has been largely with the latter method and it is the one I wish to suggest.

In considering this procedure, it is necessary to presuppose a contractor with the following qualifications: (1) Integrity. (2) Financial resources. (3) Buying power. (4) Organization. (5) Executive ability. Some of these are interdependent, but in general they represent the necessaries of the successful contractor, regardless of the basis of his contracts.

The detailed comparison of the two methods is beyond the scope of this letter and I shall content myself with some arguments for method No. 2 and let someone else argue for No. 1 if he will.

The question is largely one of buying power—I shall argue that a building can be more cheaply erected (and generally better and quicker) by a general contractor having the qualifications enumerated above than by a multitude of sub-contractors whose work is co-ordinated by the architect. In the latter case the architect practically becomes the general contractor, and as architecture is practiced to-day in this country, he cannot do so to the advantage of his client. The principal reason is that he has no buying power. The statement to a client that the general contractor method is more expensive because he pays the general contractor a profit in addition to the profits of the sub-contractor, sounds plausible, but as a matter of fact, the general contractor can buy and sub-let so much cheaper than the architect that he saves not only his own ten per cent but in most cases considerably more.

I know of a case in point. A large building was planned and supervised by one of the largest and most completely organized architect's offices in the country. The owner, wishing to be certain that he was paying the minimum for his building, instructed the architects to take competitive bids both on the general contract (including all branches of the work) and also on the separate branches. The contract was awarded as a whole to a general contractor, his bid being the lowest on the complete work and lower than the total of the lowest separate bids. The successful contractor's net profit was more than twice the profit he would gladly have taken had the work been given him without competition; and the building was completed to the eminent satisfaction of both the owner and the architect. No unusual market conditions prevailed at the time—the secret is buying power. It goes without saying that the alert, long-headed contractor would have made the same effort to make the saving for his client that he did for himself, because the low cost would have been worth far more to his reputation than the profit on the increased cost. Again, year in and year out, through good times and bad, the contractor who is assured of work at a fixed profit of 10 per cent, given him without competition, is in a far better position than he who is forced to get the majority of his work in competition, even though he might, at times, make a larger profit.

The organized contractor's buying power is based on the same qualifications as that of any business man who goes into the market to buy goods. In the first place, he knows values and he knows the market. Before he sends out for sub-bids and material prices he figures every item of the building himself. He knows exactly what the electric wiring sub-contract (for instance) is worth before he invites bids on this branch of the work. If there is a combination among the sub-contractors in this branch, he figures a way to break it.

Sub-contractors prefer to figure with general contractors rather than with architects and generally will give a better price to the contractor than to the architect. There are several reasons for this—he is dealing directly with the party who will pay him the money and is not dependent on the architect for certificates or bothered with his too often unbusiness-like methods. The alert general contractor, realizing the advantages to his reputation with those of whom he buys that prompt payment will bring, does not wait until he receives his money from the owner, but discounts his bills and sees that payments on the sub-contracts are promptly made. He thus gains for himself a reputation such that he can command the lowest cash prices and a preference in time of delivery or completion over other current work likely to bring slower payment. Further than this, he calls in the lowest bidder on a sub-contract, goes over with him the work to be performed, and is in a position to point out where savings can be made and often gets a substantial reduction on the lowest bid. He becomes a keen buyer, because that is his chief concern. To do all this requires well-developed and experience business ability and a well-equipped organization. The architect and his office as at present constituted has not and cannot have such equipment.

The advantage in time required to build has been alluded to above. There is still another advantage and one that cannot be too much emphasized. The element of divided interest is entirely eliminated. The relation of owner, contractor and architect becomes one of co-operation solely—each is striving for the best results at minimum cost and the harmony that prevails assures a successful accomplishment.

I am well aware of the arguments that can be made against this method of building, but space will not permit my taking them up. I do not think they can prevail. On the other hand I do not presume to have exhausted, in this hastily written letter, all of the arguments in favor of it.

It may seem to some that I am unwarranted in taking up the general contractor's cause, and advocating the elimination of a portion of the architect's services which he performs usually for an increased fee. To those I would say that I am only advocating that which would seem to promote the best interests of the client; and that the elimination of such portions of the architect's service as he is not qualified to perform is a direct gain to the profession, in that it will help to place us in a better position in the esteem of our fellow men.

It may be that the time will come when the architect will indeed become the master builder and perform the functions now performed separately by the architect and the builder, sometimes with varying ideals. If it does come, the viewpoint of the majority of architects to-day will have to be radically broadened and the individual will, in most

cases, have to be subordinated to an organization. The architect of to-day sets up his drafting board between himself and the work and sees little beyond it.

"The University of Uncle Sam"

The Washington, D. C., correspondent of *Engineering News-Record*, in commenting on the educational plans of the Government with reference to the advanced military training of its men, writes, in part, as follows:

"The University of Uncle Sam," so Frederick P. Keppel, assistant secretary of war, has aptly termed the greatest educational effort that this country—or probably any other—has ever made. The student output, half a million; the educational plant, 500 institutions; the purpose, to give Uncle Sam the most intelligent army that history has known.

Best of all, the announcement can be made with full confidence of success, for already there are 47,000 men in the schools and they are being turned out at the rate of 23,000 a month.

The training plan referred to has already been described. It consists of two parts—the training of technicians, and of young men in college. Plans for the latter division, known as the Students' Army Training Corps, were in hand before it was decided to lower the draft age to 18. Military training was to go hand in hand with the usual courses.

In two weeks' time, all plans have gone by the board. The certain lowering of the draft age has done it. Standard college courses are wiped out, and no college will operate this year except as a military training school.

Men prepared for college will register as usual, and will as soon as all arrangements are completed, be inducted into the army as privates, with a private's pay and subsistence. In other words, they will be under full military jurisdiction. Boys of 20 will stay in school three months; those of 19, six months; those of 18, one year. In all cases men who clearly show that they may make good army officers or technical experts may be detailed to take further instruction. It is expected that at least 125,000 men will be enrolled under this part of the plan, and to date 320 schools of collegiate rank have been accepted as training posts.

While the men are taking their school work the usual drill instruction is carried out. Experience with the technician detachments shows that in military proficiency the boys are not behind those who spend an equal time in the cantonments.

The plan has been worked out admirably and in conformity with military needs. It neglects the civilian demand for engineers and should that shortage become more acute, it may be necessary for the Government to take steps for the maintenance of the necessary municipal sanitary enterprises..

But for war needs the scheme has been excellently prepared. Aside from its military results, there will be a tremendous psychological benefit from placing these centers of patriotism and military endeavor in hundreds of cities, where soldiers before were merely men on leave. The moral effect is likely to be no less important than the military.

The officers composing the War Department's committee on education and special training and its able civilian co-workers deserve congratulations.

Glass Industry of America as Affected by the War

In anticipation of the adjustments in the industry, which will no doubt be necessary after the war, the Tariff Commission has made an investigation and report of the glass industry as affected by the war. It finds that all branches of the industry have been seriously handicapped by the abnormal conditions.

The cutting off of imported raw materials, particularly potash, followed by delays in experimenting with or in finding suitable domestic substitutes, have added to the obstacles in the way of successful manufacture. Great difficulties have been experienced in the transportation of materials and fuel and the delivery of finished products.

The report shows that notwithstanding these and other obstacles, commercial production has increased and export trade has extended to countries not hitherto reached in specific lines by American glass manufacturers. The information obtained by the commission warrants the conclusion that a new era has set in for the industry.

The consensus of opinion of glass manufacturers is that, although the European war has injuriously affected the production of a number of staple articles of American manufacture through lack of important ingredient materials, it has stimulated the industry to a remarkable degree, and has been the principal factor in the creation and development in this country of a number of new branches of glass manufacture.

Army Establishes Construction Lumber Depot

To save time and money in meeting emergency calls for lumber, the Construction Division of the Army has established a construction lumber depot at Gilmerton, Va. It is estimated that a yearly saving of approximately $250,000 will be effected through its operation.

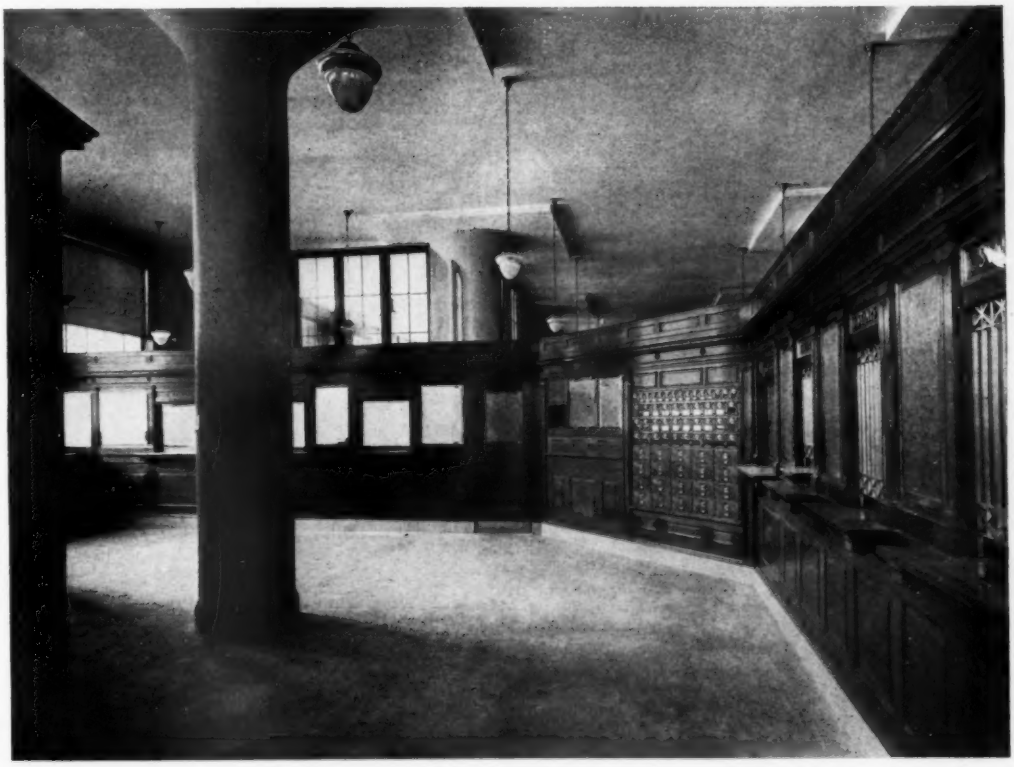


PLATE 87

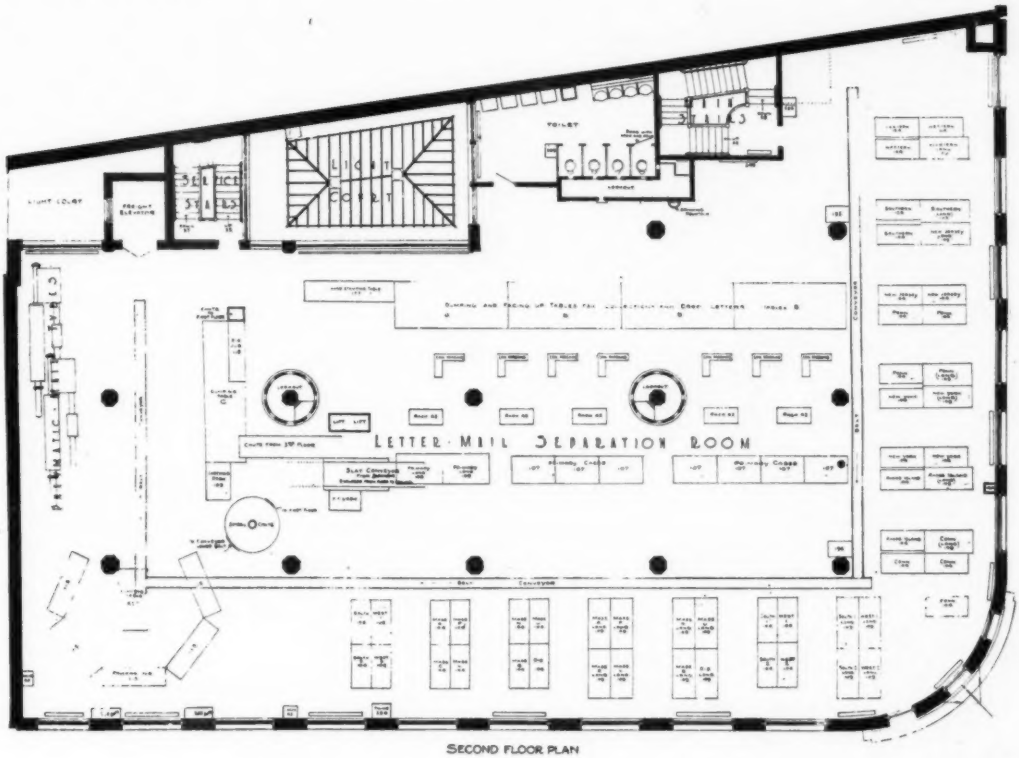
SOUTH TERMINAL STATION, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

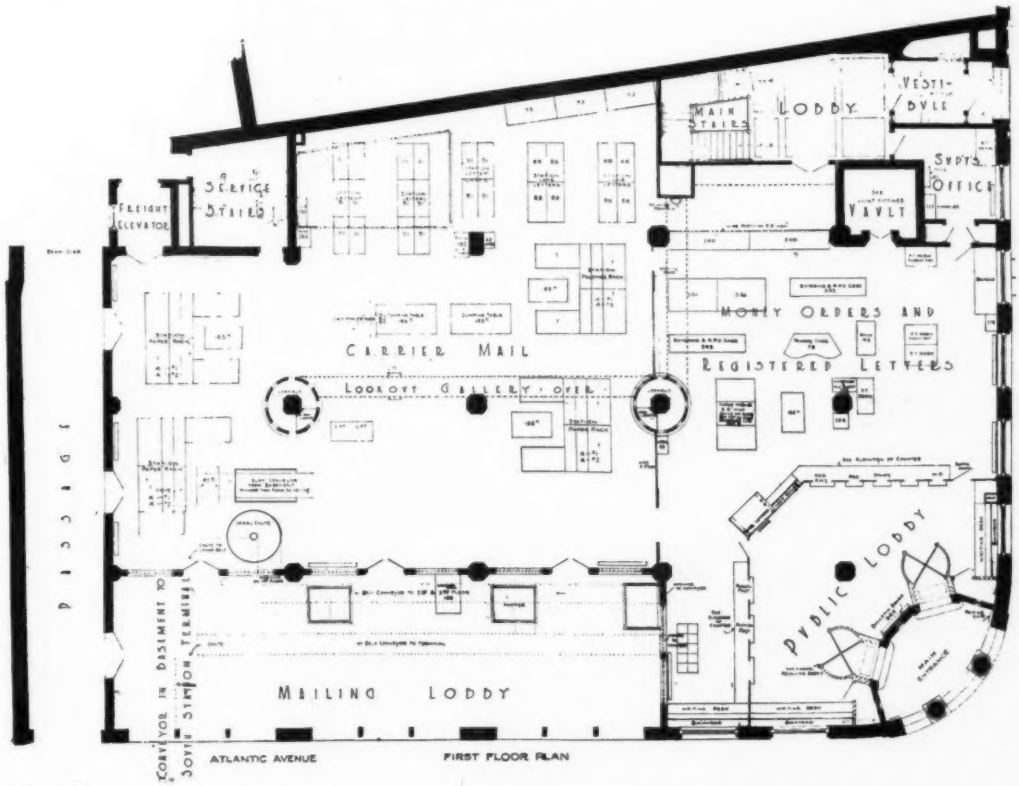
PLATE 88

SOUTH TERMINAL STATION, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*



SECOND FLOOR PLAN



FIRST FLOOR PLAN

PLATE 89

SOUTH TERMINAL STATION, BOSTON, MASS.

JAMES E. McLAUGHLIN, *ARCHITECT*

DETAIL OF FLAGSTAFF

PLATE 90

PAVILION FOR GATEWAY PARK, MINNEAPOLIS, MINN.

HEWITT & BROWN, *ARCHITECTS*

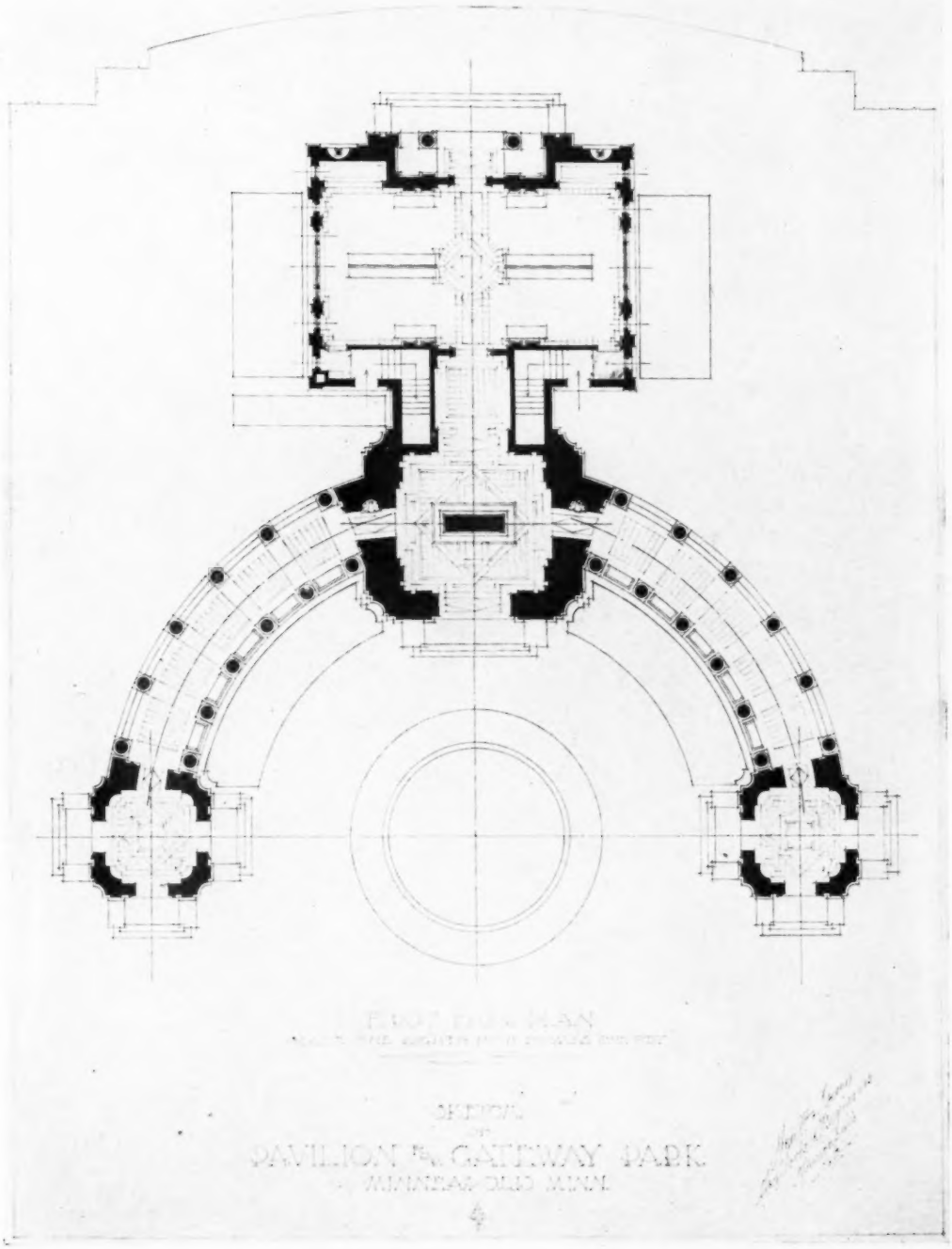


PLATE 91

PAVILION FOR GATEWAY PARK, MINNEAPOLIS, MINN.

HEWITT & BROWN, *ARCHITECTS*

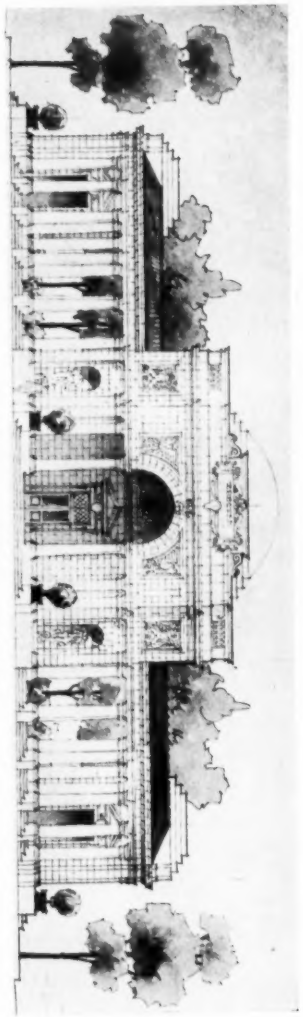
SIDE ELEVATION

REAR ELEVATION

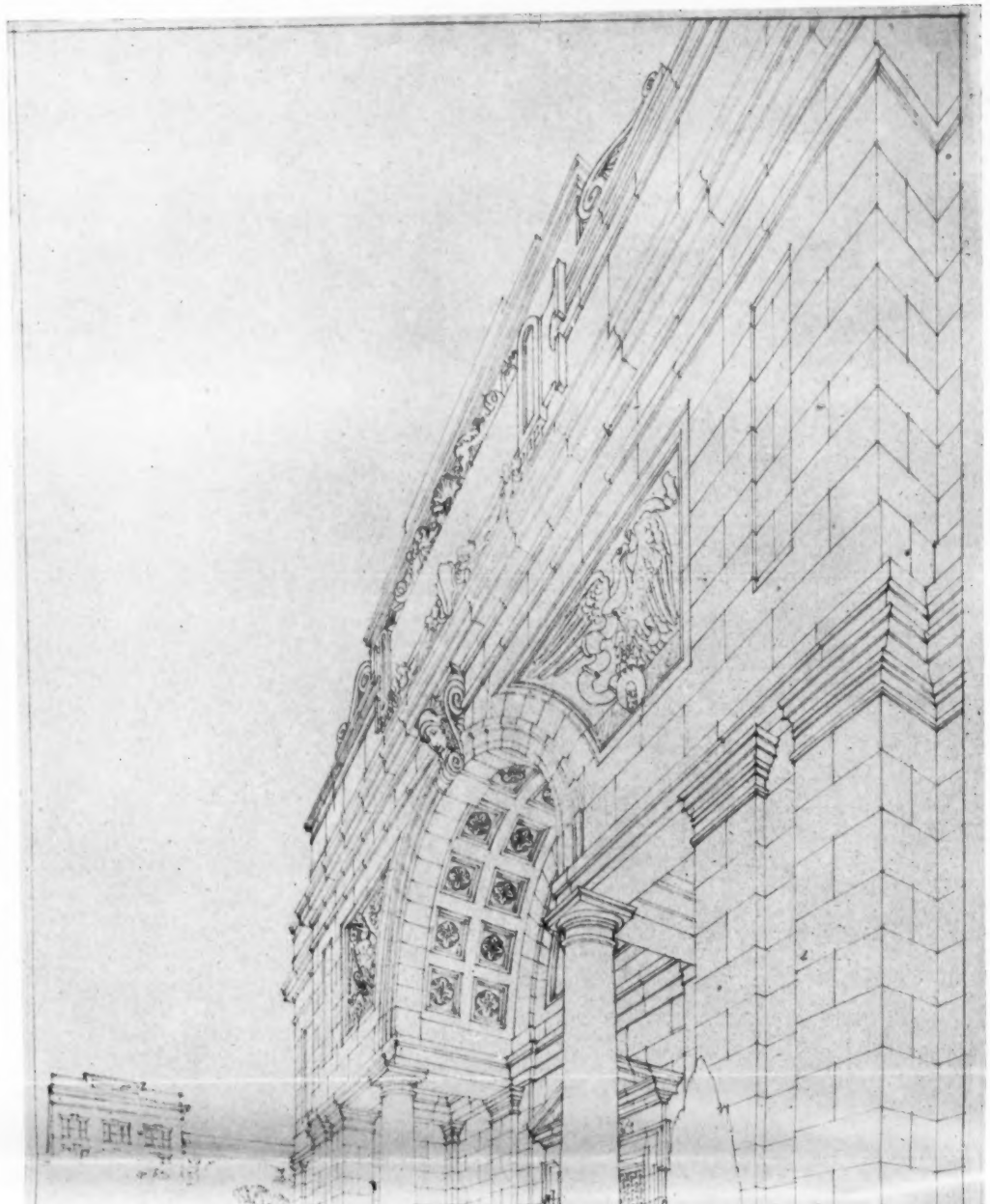
PLATE 92

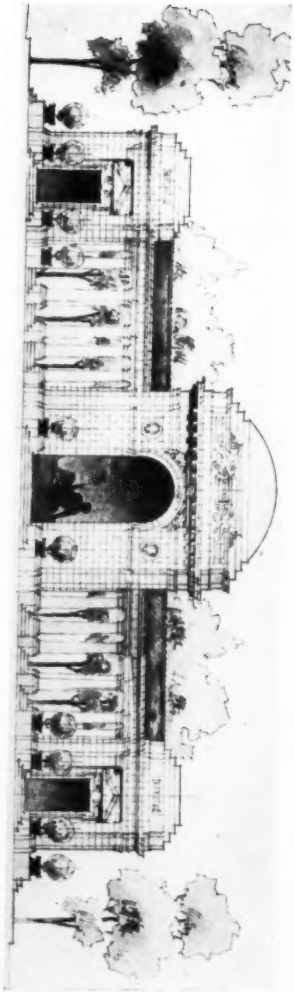
PAVILION FOR GATEWAY PARK, MINNEAPOLIS, MINN.

HEWITT & BROWN, *ARCHITECTS*

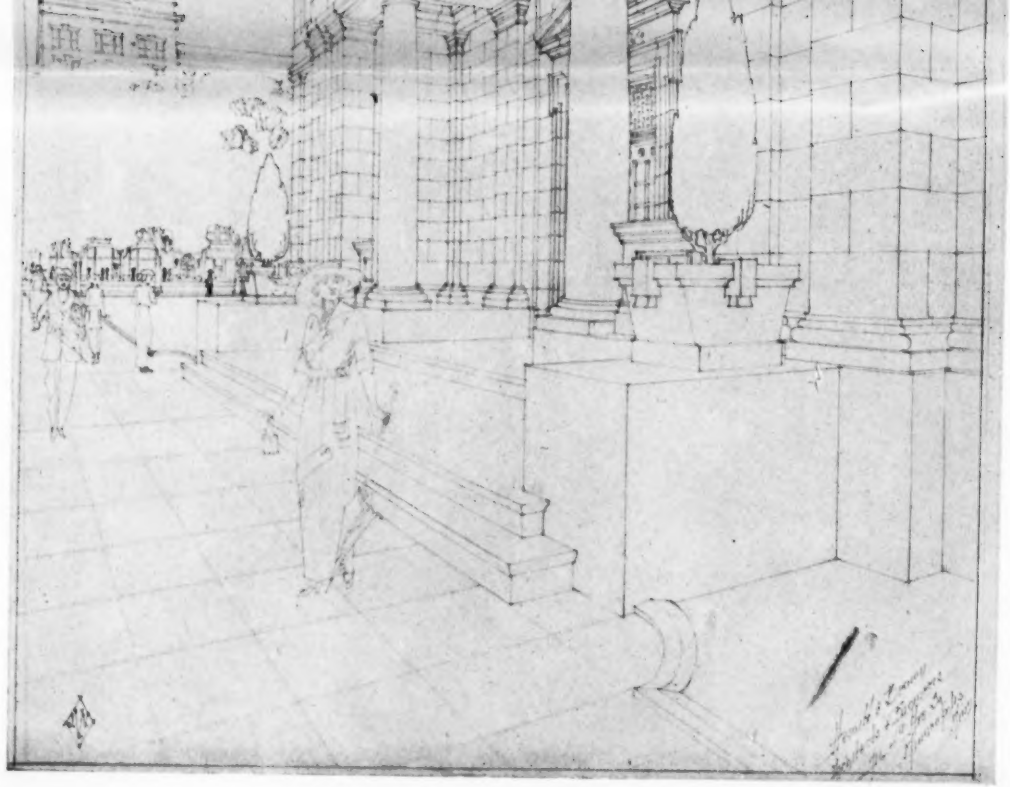


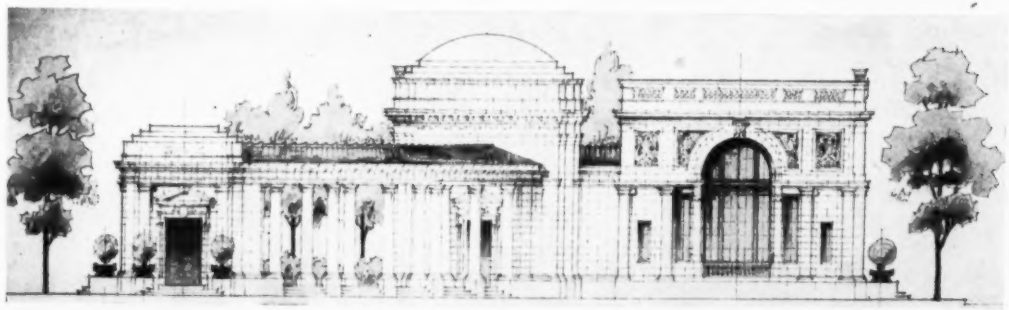
WASHINGTON AVENUE ELEVATION





PARK ELEVATION





SIDE ELEVATION

PAVILION FOR GATEWAY PARK, MINNEAPOLIS, MINN.

HEWITT & BROWN, *ARCHITECTS*

PLATE 94

HOUSE OF PAUL C. MURPHY, LAURELHURST, PORTLAND, ORE.

LAWRENCE & HOLFORD, *ARCHITECTS*

Damascene Steel

By Colonel Nicholas T. Belaiew, C.B.

One of the many articles which contributed to the world-importance of Indian trade was the famous Indian steel. It appeared in Western Europe during the Middle Ages, under the name of damascene, or Damascus steel. By another trade route through Persia and the Caucasus it found its way to Russia, under the Arabian name of "foulad," which the Persians spelled as "poulad," and the Russians as "bulat."

We find, for instance, in the journal of Prince Zvenigorodsky, the Russian Ambassador in Persia, the following words of the Shah Abbas: "Helmets and shishaks are manufactured in our country, but a good 'bulat' is brought here from the Indian kingdom."

On the other hand, from the twelfth century comes the testimony of the Arab geographer, Edrisi: "The Hindoos excel in the manufacture of iron and in the preparation of those ingredients along with which it is fused to obtain that kind of malleable iron usually styled Indian steel. They also have workshops wherein are forged the most famous sabres in the world."

The iron and steel industry was highly developed in ancient India. A witness to this exists not only in the famous wrought-iron pillar of Delhi, but in many other specimens, some of them at least being undoubtedly high carbon crucible steels.

To this last category belonged the wootz, or small cakes of carbon steel, from which the damascene blades were manufactured. Some of such cakes were investigated by Réaumur, but he found nobody in Paris who could forge them. Some others were presented to the Royal Society by Dr. Scott of Bombay and brought to this country by Dr. Pearson. Faraday took a keen interest in them, and his investigation of alloy steel, conducted in conjunction with Stodart, was the result.

Subsequent researches of General Anossoff, Professor Tchernoff and the author led to show that damascene steel was a very pure high carbon crucible steel, with excellent mechanical qualities and a splendid watering.

In his recent paper on this subject to the Iron and Steel Institute, the author explained that the splendid watering of the Oriental blades showed the amount of mechanical treatment the original cake was subjected to; this watering, from the point of view of modern metallography, was its macrostructure. In order not to spoil this watering the Oriental maker never dared to exceed the temperature of about 700 degrees.

One of the many results of this enforced carefulness was the spherodizing of cementite into globulites, and the subsequent ductility of the alloy, which struck both the ancient and modern explorer.

The author wishes to draw the attention of all interested in the production of high carbon and alloy steels to the many possibilities, especially from the point of view of after-war trade, which the damascene steel, or, we may better say, the "damascene process," offers to the steel-maker in this country and in the Indian Empire.—*Journal of the Royal Society of Arts.*

Housing Problems Acute in Denmark

The housing problem has become one of world-wide importance. Not only in countries engaged in war, where the necessity for adequate housing for labor has been strongly accented, has this problem grown to first importance, but in neutral countries there has sprung up a demand for more houses, and yet more. The following item from a daily paper sets forth conditions as they now exist in Denmark. We read:

A shortage of homes is adding to the woes of residents of Danish cities. Many brickyards, according to a Dane who has just returned from Copenhagen, have had to close, with the result that building virtually has ceased and flat hunting has developed into what might be called flat auctions.

If a flat was advertised for rent in the papers, probably a hundred persons would assemble that day outside the building. No one was admitted to the flat, but the caretaker, when he thought a large enough crowd had collected, would throw open his window, and say something like this:

"The rent of this flat, ladies and gentlemen, is so much a year. Which of you will pay me most for arranging matters?"

Then a kind of auction would be held, and whoever made the largest bid for the services of the caretaker would secure the flat.

Now the flat famine has developed to such an extent that the diligent flat seeker studies the death announcements, proceeds immediately to the residence, and assails the mourners with questions about their plans with regard to the flat.

The Question of Advertising

Now that the American Institute of Architects has agreed to recognize the right of its members to advertise, says *The Building News* of London, it will be interesting to watch the methods adopted to secure publicity. The permission, at any rate,

shows a breaking away from the ultra-conservative attitude of conventionalism that has in America and here been detrimental to the progress of architecture in this country. It probably heralds other changes later of a more far-reaching effect, which will bring architects and architecture into prominence quite creditably, but much more effectively than some of the means proposed with that perfectly legitimate end in view. None of us, of course, wish to see the styles and methods of the patent medicine vendor or the big departmental stores followed; but, as a beginning, surely no more objection could be taken—say to the inclusion by the architect of his name and address in our own "Directory" pages than to the posting of his name on a building in course of erection under his superintendence?

British Housing Committee Advocates Model Villages

The Committee on Housing in England has concluded its investigations and states that the present need for workingmen's houses in Great Britain is at least 500,000 houses, in addition to which, to meet the requirements of the normal increase in population and to take the place of houses demolished, an annual supply of 100,000 new houses is needed. Toward this shortage local authorities, in reply to circulars from the local Government Board, have so far expressed their willingness to prepare schemes, subject to substantial financial assistance from the state, for about 160,000 houses in England and Wales, and about 98,540 houses in Scotland.

It is held that a very large proportion of working class housing must still depend on private enterprise of one kind or another, and unless there is co-ordination of these various activities little will be done in many districts, and rural housing is certain to be neglected because of the difficulty of creating a sufficient local opinion to make the authorities act.

One of the schemes suggested is that large employers in industrial districts should combine to erect villages, planned on model lines, on the outskirts of towns. Co-ordination of public, private and public utility society effort is suggested, and a central housing department, with a chief commissioner for England and Wales and one for Scotland, is recommended.

The committee is convinced that unless there is some supreme guiding direction an adequate housing program is not likely to be carried out, but that the shortage of houses for some years after the war will increase rather than diminish. It recommends the establishment of a strong housing department, with an experienced and capable chief commissioner both at the local Government Board for England and Wales and at the local Government Board for Scotland. It is suggested that the country should be divided into districts and local commissioners appointed, who should work under the central control and yet have executive powers vested in them. The grouping of large employers in the industrial districts for the erection of villages on the outskirts of towns, planned on modern lines, would be a great boon for the working classes, and would have the advantage of being carried out in the form of complete schemes rather than the present unsatisfactory method. The limitation of dividend upon the share capital, which is a condition of the formation of public utility societies, prevents any exploitation of the tenants, and renders all surplus revenue, resulting from good management, available for promoting the amenities of the villages.

Method of Spruce Production

Describing the methods of spruce production on the Pacific Coast for airplane purposes, a statement authorized by the War Department says:

The Government adopted a method employed in the woods, known as riving or splitting the logs longitudinally into cants. This made transportation easier and permitted the selection in the forest of the suitable stock which split straight and clear. Forty-nine saw-mills were available, but they did not operate well on Government contracts and had not the facilities required. Early in 1918, thirty-six of them closed, claiming a car shortage.

By erecting the largest saw-mill in the world in forty-five days, the Spruce Division made a distinct record. Work of erection was begun on December 24, 1917, and the mill was completed February 7, 1918. This huge cut-up mill is at Vancouver Barracks, Washington. It has twelve separate log carriages for conveying the spruce to twelve head saws, back of which are complete sets of edgers, cut-off saws and other machinery necessary to convert the rived or sawed cants into finished stock. This mill cost the Government in the neighborhood of $200,000. There are 1940 men in the second Provisional Regiment who operate this cut-up plant, working in three shifts of eight hours each.

Before the war this sort of lumber was seasoned by air-drying, but the great demand for spruce necessitated a kiln drying process. This was worked out by the Forest Products Laboratory of the Forestry Service, and a plant costing $350,000 was

erected at Vancouver Barracks. A saving in shipping weight of 33 1/3 per cent was effected by shipping dried wood to factories. Beam stock now requires twelve days and smaller parts about seven days for drying, a saving of considerable time as compared to the air-drying system.

Southern California Chapter Awards Medal

The Southern California Chapter of the American Institute of Architects has awarded its medal "for the most meritorious work in architecture during the past year" to the State Normal School of Los Angeles, of which Allison & Allison were the architects.

The jury of selection was composed of San Francisco architects, no local men participating in the selection. It is interesting to learn on just what elements the selection of the jury was based. The report reads, in part, as follows:

"The Normal School is a well-balanced group plan—free, straightforward and losing nothing essential in the way of symmetry. The exteriors express a sentiment sympathetic with the development of the American youth. The façades are quiet and free from institutional atmosphere or pedantry. The detail and façades of the training school, fine arts building and library are highly commended, and the outline and mass of the administration building are successful."

The group of buildings, costing $600,000, was erected in 1913-1914. The medal awarded by the chapter is of bronze. This is the first award of its kind made in Southern California, and the chapter expects to make an award annually hereafter. The jury consisted of W. B. Faville, George W. Kehlman and William C. Hays.

Sand, Gravel and Stone on Non-Essential List

Except in such cases where shipments are for war industries purposes, sand, gravel and stone have been placed by the Railroad Administration on the list of non-essentials.

The reason assigned for this order was that the war industries, army, navy and merchant marine have such large coal requirements that "open-top" equipment, the type of car used to freight these materials, cannot be used for other commercial traffic. Such curtailment rules will, it is thought, tie up every sort of building activity, but officials are said to believe that this is the only method of staving off a winter shortage of coal cars. It is hoped that the maximum production of the mines can be handled during the winter.

New School Houses Banned During War

No new schoolhouses may be built during the war, the War Industries Board has announced, except for replacement. The board made this ruling when approval was asked of a plan to expend $9,000,000 for schools in New York.

This ruling, it was said, will apply also to the construction of public buildings, including postoffices, not actually needed for war purposes.

Chain of Landing Fields for Airmen Being Provided

Building a chain of landing fields for aviators stretching across the United States is progressing steadily, according to the War Department. In a few states reports show there are landing fields, equipped to furnish oil and gas at intervals of 100 miles. It is planned to have the fields also equipped to furnish shelter, limited machine shop facilities, maps, charts and barometer and thermometer ratings to the air pilots.

Project for Irish Tunnel

Advices from London state that the scheme for a tunnel between Great Britain and Ireland has been revived and that Premier Lloyd-George is to consider the project at a time not far distant.

It is thought that the construction of such a tunnel would be a most powerful influence in putting an end to the disputes and misunderstandings between the two countries.

The scheme is not a new one, plans having been in existence and laid before the Government some twenty years ago. Five plans for this tunnel are on paper, and it has even been proposed to build a solid railway across the Irish Channel. A bridge and a tube sunk beneath the surface have also been proposed.

Government Fixes Price of Cement

A schedule of Government purchase prices for cement based upon the important cement shipping points throughout the country has been announced by the War Industries Board. The prices agreed upon at a conference between the board's price-fix-

ing committee and the war-service committee of the cement industry will be effective for the four months' period ending Dec. 31.

The f.o.b. prices at the following locations are:

	Per Barrel
Hudson, N. Y.	$1.82
Northampton, Pa.	1.72
Universal, Pa.	1.72
Fordwick, Va.	1.67
Bellevue, Mich.	1.77
Mitchell, Ind.	1.67
Hannibal, Mo.	1.67
Buffington, Ind.	1.57
Lasalle, Ill.	1.57
Mason City, Ia.	1.67
Iola, Kan.	1.72
Steelton, Minn.	1.67
Kingsport, Tenn.	1.62
Richard City, Tenn	1.62
Harris, Tex.	1.67
Houston, Tex.	1.77
El Paso, Tex.	1.92
San Antonio, Tex.	1.92
Trident, Mont.	1.87
Portland, Col.	1.72
Devils Slide, Utah	1.87
Brigham, Utah	1.87
Salt Lake City, Utah	1.87
Irwin, Wash	1.92
Concrete, Wash.	1.92
Oswego, Ore.	1.97
Cement, Cal.	1.92
Davenport, Cal.	1.92
Crestmore, Cal.	1.92

Shipments in bulk, five cents per barrel less.

Shipments in paper bags, thirty cents per barrel additional.

Shipments in cloth bags, $1 per barrel additional.

The Demand for Steel

Bernard M. Baruch, chairman of the War Industries Board, has stated that the demand for steel was constantly increasing as the war needs and uses grew, and that the heavy war pressure on this material made any non-war use out of the question.

The War Industries Board has recently had before it a question of material for new Federal post-office buildings and for new state and municipal school buildings. The chairman said that Secretary McAdoo had decided some time ago that new public buildings were not necessary during the period of the war. This position was taken by the War Industries Board. Also the War Industries Board has ruled that new school buildings, unless needed for replacement, came within the same prohibition and could not be supplied with material in view of war need. He pointed out that the construction of buildings involved the use of labor, material, transportation, and fuel, all needed urgently in war work.

Trained Men Needed

On account of the great number called into different forms of service, the demand for men trained as landscape architects, particularly in the field of city planning, already far exceeds the number of men available. These needs are clearly increasing, and will continue to increase not only during the war but also during the following period of reconstruction. This reconstruction is recognized as involving both the rebuilding of destroyed communities and the development and reorganization on an unprecedented scale of areas intensively occupied in their relation to state and nation. To meet these needs now by the immediate training of men fitted to participate in this exceptional public service, it is of the utmost importance that properly qualified men should offer themselves for this training.

For further information address:

PROFESSOR J. S. PRAY,

Chairman of the School of Landscape Architecture, Harvard University, 50 Garden Street, Cambridge, Mass.

San Francisco Society of Architects

The San Francisco Society of Architects has nominated the following officers for 1918-19: President, Mr. John Reid, Jr.; vice-president, Mr. Ernest Coxhead; secretary and treasurer, Mr. Warren Perry; directors, Mr. Geo. W. Kelham and Mr. G. A. Lansburgh.

Personal

Cecil Bayless Chapman, architect, of Minneapolis, Minn., died at his home after a lingering illness. Mr. Chapman, who had practised his profession in Minneapolis for twenty years, was a member, and at the time of his death secretary-treasurer, of the Minnesota Chapter A. I. A.

Preston, Brown & Walker, architects, David Whitney Building, Detroit, Mich., announce dissolution of partnership. J. Martin Brown and Martin A. Preston, having taken over all interests of the former firm, will continue the business at the same address, under the name of Brown & Preston, architects and engineers. Mr. R. L. Walker, having withdrawn, will follow other activities.

Department of Architectural Engineering

The Swimming Pool

In Two Parts—Part I

STATISTICS demonstrate that this country is fast becoming a bathing nation. It seems incredible that the first bathtub in the United States was installed in Cincinnati about seventy years ago, and that its use created quite a discussion in the medical profession. There was a decided division of opinion as to the resulting effect on the health of a person who should use a bathtub. Later, the city council of Philadelphia, by a bare majority, defeated a proposed ordinance prohibiting the installation of bathtubs in that city. Since that time, the mechanical difficulties involved in the manufacture of bathtubs have been steadily overcome and the problems of water service, waste and ventilation have all been successfully solved. To-day the bathtub can be accepted as a perfected product in so far as its sanitary use is concerned.

The development of the swimming pool has had an equally varied and progressive career. From the plastered masonry or brick tank, the reinforced concrete tank has become the standard form of construction. The enameled brick and marble lining has been displaced by the encaustic tile, and terra cotta or tile finished drainage gutters have been brought to a high state of perfection. A standard dimensioned tank has been adopted for water sports under the direction of amateur athletic rules. The construction of a pool, either in the ground or on the upper floor of a building, presents no problem not easily solved by ordinary engineering design. The pool is filled with heated water, drained, and the surfaces are so finished that they can be easily made sterile.

The number of swimming pools in this country is increasing constantly. Ninety-nine large municipalities have established them. They form a part of the equipment of many high schools and are usually an adjunct of Y. M. C. A. buildings, clubs and other social service buildings. The educational importance of swimming has been recognized, many colleges and secondary schools having as a graduation requirement ability to swim.

The sanitary condition of a bathing facility used by more than one person is the factor that subordinates all others, and of late years this phase of the operation of swimming pools has been much studied. Some have investigated the danger of contracting diseases and others have sought the means to make them safe.

It has been proved that diseases of an ocular, aural, venereal and intestinal nature are transmissible from swimming in polluted water. It is also an established fact that some persons are disease carriers, and it has been estimated, for example, that three-tenths of one per cent of the general population are typhoid carriers. Typhoid fever in New York is endemic and at times epidemic. This is true of some other cities, and this condition of public health renders the improperly maintained pool a danger. It is then apparent that a swimming pool, instead of being a beneficial sanitary facility may become a positive menace to the health of the users. The means of making them safe have been developed to a point where it is justifiable to announce it as a fact.

Before discussing the methods of disinfecting swimming pools, here is presented the proposed Standards for Swimming Pool Legislation,* by Wallace A. Manheimer, Ph.D., Secretary American Association for Promoting Hygiene and Public Baths.

This is a subject of such vital importance to communities where swimming pools are operated that their proper regulation is a necessity. If such regulations do not exist, it is well within the province of architects, engineers and physicians to see that such standards are enforced by law. The proposed standards follow:

The regulations concerning pools can be con-

*The Medical Record, March 9, 1918.

veniently divided as follows: (1) Regulations concerning the management of the water; (2) regulations concerning the construction of pools, including the reduction of fire hazard and the provision of safety devices; (3) sanitary control of premises and bathers. No attempt is here made to set forth the regulations, merely standards are suggested.

A. Standards Concerning the Management of the Water

1. The bacterial contents of the water supplied to a swimming pool must conform with that of drinking water, or, if polluted, must be disinfected before use.

2. The water in the swimming pool during use must be continuously diluted by adding fresh water, or, by re-using the water from the swimming pool after filtration. (Note: It is preferable to keep re-using the pool water by a process of circulating it through a filter—refiltration. This will conserve both the water and the fuel for heating.)

3. The water must be maintained clear at all times to an extent at least sufficient to see a submerged person in any part of the pool. (Note: The manner of accomplishing this should be left to the proprietor of the establishment; however, the most satisfactory method so far introduced is by the continuous circulation of the water through a filter—refiltration.)

4. The water must be either periodically and regularly or continuously disinfected, unless emptied daily. The bacterial count must not exceed 10 colon bacilli per cubic centimeter. (Note: No upper limit for total bacterial count should be set until further experience has been accumulated on pool sanitation. The frequent emptying of the pool should not be compelled or encouraged because disinfection and refiltration give as good results as frequent change of water and because the frequent change of water causes needless waste of water, fuel, power for pumping, etc.)

5. The method of disinfection must be satisfactory to the Department of Health. (Note: No method should be prescribed in view of the advances constantly being made on this phase of pool sanitation; chlorine and other chemicals, ultraviolet light, and particularly ozone, all have their advantages.)

6. The water from the pool must, when discharged, cause no contamination of any stream used for drinking purposes and should, if possible, be disposed of as sewage water.

B. Standards Concerning the Construction of Pools, Etc.

1. The lining of the pool must be white or nearly so, smooth (readily cleansable), and impervious to water. The corners of the pool should be rounded.

2. There must be no obstructions in the water. Stair and stair supports must be of metal or stone.

3. Water from the floor surrounding the pool must not drain back into the pool.

4. The floor must be constructed of material impervious to water, must be adequately drained and composed of material designed to prevent slipping, and, if possible, a poor conductor of heat.

5. There must be a scum gutter on at least two opposite sides of the pool, and preferably completely surrounding the pool, for the purpose of draining off surface dirt and of affording a place for bathers to spit. The scum gutter must drain into the sewer or cesspool and not back into the recirculation system.

6. Construction should be made with due regard to the elimination of fire hazards, taking into account the providing of sufficient exits to accommodate the largest crowd that would be likely to attend exhibitions, etc.

7. The pool should be shallow at one end and deep enough at the other to permit diving with safety, unless constructed as a wading pool for children.

8. Dressing room compartments in indoor pools must be constructed vermin-proof.

9. Bathing establishments should be under permit of the Department of Health to include construction and operation.

10. Adequate shower baths and toilet facilities must be provided; also hot water for showers in indoor pools; toilets must be screened against flies, unless water-flushed and covered by toilet seats.

11. Sanitary drinking fountains with pure water must be supplied.

C. Sanitary Control of Premises and Bathers, Etc.

1. Adequate light and ventilation must be provided.

2. A temperature of the air during the winter in indoor pools of between 70 deg. and 80 deg. F. must be maintained.

3. No common towels, combs, brushes, or drinking cups may be provided.

4. All towels, suits, etc., provided by the establishment for public use must be sterilized after each separate use.

5. Anti-spit signs must be conspicuously posted. Signs in large letters must be posted in dressing compartments directing all bathers, men and women, to take a preliminary cleansing shower in the nude with warm water and soap and to empty the bladder before going into the pool. All bathers must rinse off the soap before entering the pool room.

6. No diseased or intoxicated person should be permitted to use a swimming pool.

7. Only persons dressed for bathing may enter the pool room.

8. Men and boys must bathe in the nude or be provided with sterilized suits. Suits for men and women must be of fast color and of a lintless material.

9. A life guard must be present at all times. He must be acquainted with the technique of resuscitation of the apparently drowned and have equipment at hand for rescuing and resuscitation. He, or some attendant, must supervise the incoming bathers to enforce the regulation concerning the preliminary bath and to exclude undesirable and diseased persons.

10. The room must be locked during the emptying and refilling of the pool, or other steps be taken, so that bathers will not accidentally dive into an empty pool.

11. The pool when emptied must be well scrubbed.

12. No smoking should be allowed in indoor pools.

13. Cuspidors must be provided in the dressing rooms and pool rooms.

14. If the tub baths are supplied they must be disinfected after each separate use.

The first pools were emptied and cleaned after certain periods of use or they were supplied with a constant flow of warm water with a constant waste. In the first instance the idea was to change the water after it had become polluted to a certain degree by use. This method insured clean water at one period at least. In the second method the idea was to dilute the foul water to a supposed usable degree, but the water was always foul. Another objection to these methods is the waste of water as such and the waste of fuel in warming this water. This latter consideration is one of increasing importance as is well understood.

The logical solution of the problem then was to purify the water and recirculate it without the loss of the heat units it contained. The mechanical work is done by withdrawing the water from the pool through a pump and passing it through a filter. After filtration the water is reheated and treated by the addition of various chemicals or exposing the water to ultraviolet rays.

The chemicals used for purifying the water are sulphate of copper or calcium hypochlorite. While these chemicals will destroy bacteria when properly used, the former stains the walls and floor of the pool in an unsightly manner and neither of them destroys the suspended organic matter that may be in the water. In addition they are objectionable on account of the alteration in the taste of the water and because of their irritating qualities. While this objection may be overcome to some degree by proper management, a technical knowledge is required which is not usually obtainable for such work. Ultraviolet light is not capable of penetrating turbid water and its efficacy is reduced in water containing coloring matter or colloidal substances. These deficiencies are natural and are not readily overcome. To become truly effective more time for applying the light is necessary than can usually be given.

The purification of swimming pools has been made a special study by Wallace A. Manheimer, Ph.D., Research Laboratory, Department of Health, New York City. In his investigations Dr. Manheimer found that the purification of a drinking water supply once accomplished was safeguarded against subsequent pollution, but that, from the very nature of things, this is impossible in a swimming pool. Here the initial purification is of small value since effete matter is being constantly added and it becomes necessary to counteract this pollution continuously. Furthermore, the load of organic matter and bacteria in a swimming pool varies with the number and type of people using it, while the load of such substances in a drinking water remains fairly constant or fluctuates slowly. It is, therefore, not a very difficult matter, presupposing proper design, to adjust the apparatus so as to destroy the average load of pollution which is in a drinking water supply. In pools this adjustment would involve constant modification if a nice balance is to be struck and no objectionable odors produced through the use of an excess of the chemical reagent.

The addition to the water of chemicals in concentrations greater than necessary to effect initial purification for the purpose of disinfecting all subsequently added pollutions, has, unfortunately, not worked out in practice; and because of the astringent condition of water resulting, all attempts in this direction have been abandoned. In order to overcome, as far as possible, a continuously added polluted matter, the recourse has been to dilution. At first, reliance was placed on the addition of fresh, warm, filtered water, but the cost of this procedure was so high that it had to be discontinued. Furthermore, when a turbid city water supply was used, it was found that to add the dilution water in sufficient quantities to counteract the pollution of the pool, the filters had to be operated beyond their capacity. This resulted in an opacity that was dangerous in that a submerged person could not be seen. As a matter of fact, several deaths have unnecessarily occured as a result of such opacity. For the reasons just set forth, it was

better to refilter the pool water which is already fairly clear and to depend on disinfection for further purification. Accordingly, Dr. Manheimer has recommended as a standard procedure the refiltration of the water for the purpose of clarification and the chemical treatment of water for purification.

Objections have been made that the water after refiltration and disinfection contains urine, dissolved organic substances and fecal matter. This he believes is not true. The filters, if properly operated, will remove all solid substances and the process of disinfection, if properly carried on, can be relied on to bleach the dissolved coloring matter and reduce any dissolved effete substances to chemical entities far removed from the sources from which they have sprung. After a little careful study, sensitive people will feel that not only is the danger from refiltered and disinfected water far less than it is from the average town water supply, but they would agree that the average water supply is likely to contain more actual waste products, although perhaps not so much of their oxidizable derivatives.

As a result of these investigations, Dr. Manheimer states that the conditions which any method of disinfecting a swimming pool should fulfill are:

(1) Automatic control, that is, control involving no technical ability on the part of the pool attendant.

(2) Reliability of disinfecting power under all conditions of practical operation.

(3) The adding of no objectional material to the water.

(4) The bleaching or reducing of all dissolved matter in the water so as to reduce them chemically as far as possible from the sources from which they spring.

As ozone had been successfully applied to the purification of water supplies, it was decided to investigate its application to swimming pools. Concerning the use of ozone for the purification of large drinking water supplies, Spalding* states that the forty-nine large ozone plants abroad regularly deliver pure water to large municipalities. In France he cites twenty-six plants, in Roumania four, in Spain one, in South America three, in Germany seven, in Italy five, and in Russia three. The plant at St. Maur supplies the city of Paris with 24,300,000 gallons daily, the Bon Voyage plant supplies Nice with 6,480,000 gallons daily, the plant at Villefranche supplies 7,020,000 gallons daily, and the plant at Petrograd supplies 14,040,000 gallons daily, to mention only some of the largest.

Ozone is the only economically produced chemical known that can be relied upon to destroy bacteria, bleach coloring matter, successfully attack organic substances and at the same time leave no objectionable substance in the water. It also thoroughly aerates water and enhances its appearance.

In the investigation of the use of ozone for this purpose, Dr. Manheimer first applied ozone to the purification of a miniature pool. He concluded from his experiments that ozone efficiently purifies water if proper contact of ozone and water be effected; that the application of ozone to pool water is automatic in its control and reliable in disinfecting pools. Furthermore, it can be added without objectionable result in any excess, since it is not very soluble in water. It oxidizes most of the organic matter in the water and is inexpensive in application.

As a result of these preliminary tests, he secured the installation of a large ozone plant at the Twenty-third Street Bath, New York. The mechanical production and application of ozone to this pool will be fully described and illustrated in Part II of this article, the results of the tests are here given.

The bacterial counts in this pool were so low after continuous operation of the ozone machine that it was deemed advisable to add a large number of *B. coli* to the water in order to observe the efficiency of ozone on heavily polluted water. Accordingly a mass culture of *B. coli* was emulsified in salt solution and thrown into the pool. In order to secure a thorough mixing of the bacteria with the pool water and to keep the pollution high, the circulating pump was shut down between 10 a. m. and 2 p. m., a long handled brush was used to stir the water, and this, together with the agitation produced by the bathers, resulted in a uniform mix. The pool was then operated as usual and two hours later the tests were made.

One Part of Ozone per Million of Water

(Note.—All bacterial counts are averages of three or more determinations.)

Using ejector:

Bacterial count in the artificially infected pool, 3,700 per cubic centimeter.
After filtration and before ozonation, 1,850 per cubic centimeter.
After ozonation, no growth in 1 cubic centimeter.
After ozonation, no growth in 3 cubic centimeters.

In addition to plating one cubic centimeter of the water delivered from the ozone tower, three cubic centimeter samples were plated as well. In the majority of cases no growths were obtained.

Using blower:

Pool water in the artificially infected pool, 3,500 per cubic centimeter.
After filtration and before ozonation, 1,540 per cubic centimeter.
After ozonation, no growth in 1 cubic centimeter.
After ozonation, no growth in 3 cubic centimeters.

*Spalding: Application of Ozone to Water Purification, N. Y. State Department of Health, 1913.

The results, using the blower, are identical with the foregoing. We conclude, therefore, that when one part per million of ozone is used, either with an ejector or with a centrifugal blower (which delivers more air), the pool water artificially contaminated with *B. Coli* is sterilized.

USING 0.5 PART OZONE PER MILLION OF WATER

The foregoing results were so striking that it was determined to cut down the amount of ozone supplied to the pool to ascertain the safety factor allowed when supplying one part of ozone per million of water. For this purpose the output of the ozonator was reduced to one-half by removing three of the six tubes.

Using ejector:

Count from pool (artificially infected), 2,700 per cubic centimeter.
After filtration and before ozonation, 1,580 per cubic centimeter.
After ozonation, 1⅓ colonies per cubic centimeter.
After ozonation, 1 to 3 colonies in 3 cubic centimeter samples.

When using half part of ozone per million of water and introducing the ozone by means of the ejector, the contaminated pool water was delivered in a relatively pure condition. A pool operated in this way, using half the quantity designed, while not delivering entirely sterile water, would be sufficiently pure for all practical purposes.

Using blower:

Count from pool (artificially infected), 3,020 per cubic centimeter.
After filtration and before ozonation, 1,150 per cubic centimeter.
After ozonation, 130 per cubic centimeter.

When the blower was used a larger number of bacteria escaped destruction. This was due, in the writer's opinion, to the larger quantity of air introduced into the ozonator, resulting in a dilution of the ozone, and to the more rapid escape of the gas from the water. A noticeable odor of ozone is observed when the blower is used, indicating that the ozone escapes without a sufficient opportunity of mixing with the water. The conclusion is reached, therefore, that the use of a turbine blower is inferior to that of an ejector, and that a great dilution of ozone in air is a disadvantage.

A more recent extensive series of tests was made to obtain data on which to judge the reliability of the process over an adequate period of time. These tests were made on alternate days, three times a week, for a period of three weeks without renewing the water. The results were entirely comparable to those before given and furnishes an absolute demonstration of the efficacy of ozone when applied as in this instance.

The attendance in this pool is exceptionally large, reaching at times 1500 bathers a day. This necessarily causes high pollution. The water, in recirculating, was delivered sterile regardless of the counts before ozonation. In addition to this the water was bleached, gradually assuming a transparent blue, so that as the pool continued to be operated, the appearance of the water improved. Consequently where adequate refiltration is combined with ozone disinfection, the water may be retained in the pool for a considerable length of time, effecting a material reduction in the cost of maintenance.

In conclusion, ozone is recommended for swimming pool purification because:

1. It is a reliable disinfectant.

2. It is capable of purifying heavily polluted pool water.

3. It produces no objectionable substances in the water.

4. It improves the appearance and transparency of the water, permitting a longer continued use of the pool, a consequent reduction in the cost of maintenance, and a reduction in the hazard of drowning.

5. It is inexpensive in application.

A very extensive bibliography on this subject is given in Reprint No. 299 from the Public Health Reports, U. S. Public Health Service, entitled Essentials of Swimming Pool Sanitation, by Wallace A. Manheimer, Ph.D. Further reference can be made to Reprint No. 456, Public Health Reports, of the same service, entitled The Application of Ozone to the Purification of Swimming Pools, by the same author; The Journal of the American Association for Promoting Hygiene and Public Baths, January, 1918; Comparison of the Methods for Disinfecting Swimming Pools, The Journal of Infectious Diseases, Vol. 20, No. 1, January, 1917, and Reliability of Ozone in Swimming Pool Disinfection; The Journal of the American Medical Association, June 29, 1918, Vol. 70, and Studies on the Sanitation of Swimming Pools, Journal of Infectious Diseases, July, 1914, by Wallace A. Manheimer, Ph.D.

The Importance of Building Revenue

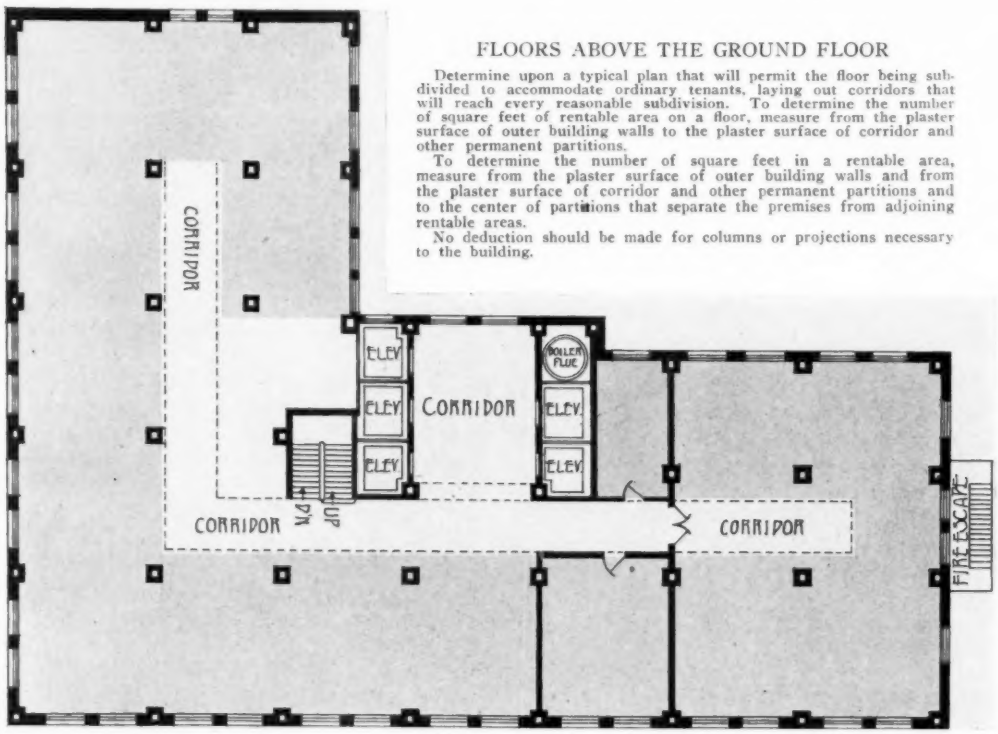
ASIDE from residences, places of religious worship, schools, penal and administrative or executive buildings, the actuating motive for constructing all other kinds of buildings is revenue. These revenues are regarded strictly as money values. The kinds of buildings first mentioned return revenues that are not so measured.

The owners of these buildings primarily base the success of their effort and the desirability of ownership on the money returns rather than on the appearance of the building. Intelligent ownership, however, does not undervalue the artistic merit that a building should have and this quality does have a beneficial effect on the returns. A building can be a perfect example of architectural design as applied to its exterior appearance and interior detail and at the same time be so arranged as to plan and design as to elevation that the building is a failure from a revenue viewpoint.

The successful building is that one which combines the two factors of correct architectural design and revenue producing plan and construction. That portion of the construction that includes the interior finish such as the floors, walls, woodwork and other things should be selected for its appearance, durability and its cost of maintenance. Appearance and durability have an effect on the initial cost and the fixed charge that attends all investments. The cost of maintenance in the matter of keeping the things clean and presentable is too often overlooked. This is a daily cost and not to be considered as a fixed charge in the form of interest on the investment. It is also a variable cost which depends on the price of materials and labor. In normal times these maintenance costs do not fluctuate to any extent.

The cost of alterations is also a very important item of maintenance and those materials that can be displaced and reused with the least cost are the more desirable. In the modern office building these alterations are figured on as a matter of course and are an expenditure that aids revenue. The old style office building with its high stories, heavy partitions and cumbersome wood finish are very expensive to alter and unless these changes are made new tenants are lost and old ones leave as the changes of their business make it necessary.

When an office and store building is designed the revenues and expenditures must be estimated to form a basis of investment. The expenditures will


FLOORS ABOVE THE GROUND FLOOR
Determine upon a typical plan that will permit the floor being subdivided to accommodate ordinary tenants, laying out corridors that will reach every reasonable subdivision. To determine the number of square feet of rentable area on a floor, measure from the plaster surface of outer building walls to the plaster surface of corridor and other permanent partitions.
To determine the number of square feet in a rentable area, measure from the plaster surface of outer building walls and from the plaster surface of corridor and other permanent partitions and to the center of partitions that separate the premises from adjoining rentable areas.
No deduction should be made for columns or projections necessary to the building.
CORRIDOR
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CORRIDOR
FIRE ESCAPE

NATIONAL ASSOCIATION OF BUILDING OWNERS AND MANAGERS
CLASSIFICATION SCHEDULE

Adopted in Convention at Saint Louis, September 13, 1916

OFFICE BUILDING No..... Square Feet of Rentable Area.....

RECEIPTS:			
Rent			.....
Electricity and Steam			.....
Ice and Water			.....
Waste Paper			.....
Miscellaneous			.....
			.....
EXPENDITURES:			
ADMINISTRATION			
Salaries or Commission	.....		
Office Expense and Supplies	.....		
Legal Services	.....		
Advertising	.....	.....	
JANITOR DEPARTMENT			
Wages	.....		
Supplies	.....	.....	
ENGINEERING DEPARTMENT			
Wages	.....		
Supplies	.....		
Repairs	.....		
Fuel	.....		
Ash Removal	.....	.....	
ELEVATOR DEPARTMENT			
Wages	.....		
Supplies (including cables)	.....		
Repairs	.....		
Power	.....		
Uniforms	.....	.....	
ALTERATIONS AND REPAIRS			
Painting and Glazing	.....		
Plumbing and Steam Fitting	.....		
Carpentering	.....		
Masonry and Plastering	.....		
Electric Work	.....		
Lumber and Mill Work	.....		
Hardware (including keys)	.....		
Marble and Tile Work	.....		
Rubbish Removal	.....	.....	
ELECTRIC LIGHTING			
Electricity	.....		
Lamps	.....	.....	
GENERAL EXPENSES			
Wages of Watchman	.....		
Water	.....		
Toilet Room Supplies	.....		
Miscellaneous	.....	.....	
		.....	
TOTAL OPERATING EXPENSE			
Taxes		.....	
Insurance		.....	.....
NET EARNINGS 191..			.....

consist of the purchase of real estate and the broker's commissions for this, commissions for loans, architect's fees and the cost of the building itself. These items form the initial cost which entails a fixed charge in interest, sinking funds and other items.

Operating and maintenance expenses are entirely different and are not fixed, as they are subject to variation due to management. These costs are classified in schedule form by the National Association of Building Owners and Managers, the form of which is here given. In this form the sources of revenue are given, against which is charged the cost of administration, janitor service, engineering and elevator departments, alterations and repairs, electric lighting and general expenses, the total of which constitute the operating expense. To this must be added all taxes and insurance. The difference between this total and the amount of the receipts is designated as a net earning.

It is apparent, however, that the owner must deduct from this balance, here called a net earning, the fixed charges before referred to. These fixed charges do not have any relation to the items included in the schedule and it is on these latter items that the success of management is determined.

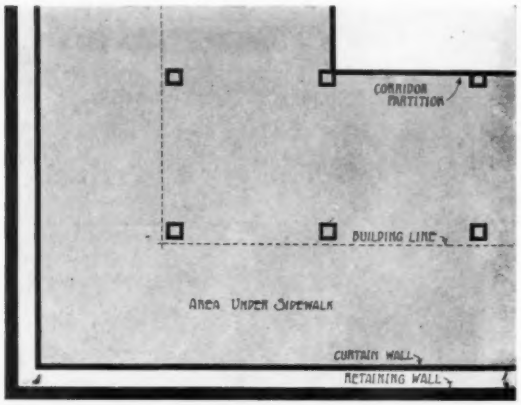
The net earning as found is converted into a sum related to the square feet of rentable area.

To make this intelligible and truly comparative the rentable area must be based on a standard scheme of measurement. The variation in the ways of measuring rentable area is as great as in estimating the cubic contents of buildings on which architects and contractors base preliminary estimates of cost. In the latter case the cost per cubic foot is utterly meaningless without an explanation of the method of measuring the contents. A standard method of measuring floor areas has also been adapted by the National Association of Building

Owners and Managers which is here given.

The rule applies to basements, stores and floors above the ground floor. The rule is given in connection with each diagram illustration. Supplementing the rules, the following notes are given by the Floor Measurement Committee:

The square foot is the generally accepted unit in measuring floor area. It should be understood, however, that a square foot of space with a price attached to it gives



BASEMENTS

If the rentable area extends beyond the building line under the sidewalk, measure from the curtain wall or finished surface of the retaining wall and from the plaster surface of corridor and other permanent partitions and to the center of partitions that separate the premises from adjoining rentable areas. If the rentable area is entirely inside the building line, measure from the plaster surface of building walls and from the plaster surface of corridor and other permanent partitions and to the center of partitions that separate the premises from adjoining rentable areas.

No deduction should be made for columns, projections or footing stones necessary to the building.

no idea of location, style of architecture, material used in construction, safety, light, ventilation, height, conveniences, outlook, character of neighbors, kind of management and quality of service rendered, all of which enter into the value of the square foot of floor area.

Permanent partitions enclosing corridors, elevators, stairways, toilets, janitor closets, etc., have the same relation to rentable area as do outer building walls.

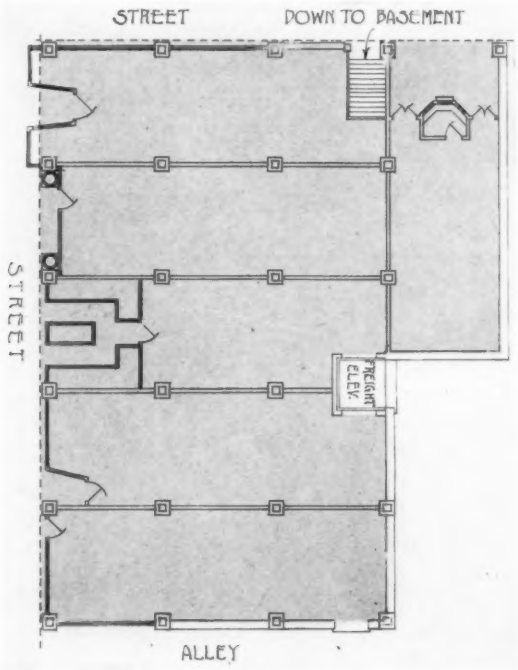
After a typical plan has been adopted for floors above the first floor and the amount of revenue each floor is expected to yield has been decided upon, a standard has been established which should remain the same under ordinary circumstances whether the floor is occupied and the rent paid by one tenant or by several tenants.

When conditions arise that make it necessary to increase or decrease basic charges and when unusual alterations change the appearance of a floor or throw corridor space inside leased premises, the rate per square foot may be changed to meet the changed conditions, but the typical rental area should not be changed.

It is desirable to have the total rentable area of a floor remain the same at all times no matter how many tenants occupy the floor or what sub-divisions are made. This is accomplished when measurements are made to the center of partitions that separate suites or units.

The price of stores ordinarily is based on site value rather than on square foot area. The location of glass and plaster varies greatly in the case of store fronts on account of the diversity of needs of tenants and on account of the variation in city ordinances. For these reasons it is found most practical to measure street frontage of stores from the building line. Some street frontages do not have much glass and some do not have any glass, but full glass fronts are liable to be installed at any time and street frontages have advertising and selling value where glass is not installed. Glass show windows on alleys are of doubtful value; therefore, alley frontages should not be classed as street frontages.

The particular difference in buildings will be found in the areas set aside for joint use of tenants, such as corridors, toilets, elevators and stairways, and in the areas set aside for the building's service, such as janitor closets, pipe shafts, cut-out cabinets and meter closets. The cost of cleaning and maintaining areas used jointly and for the building's service is charged to tenants in proportion to the size of the premises occupied, therefore, it is not necessary that they be measured or considered in calculations made for comparison, but if areas used jointly and for



STORES

To determine the number of square feet in a rentable store area, measure from the building line in the case of street frontages and from the plaster surface of other outer building walls and from the plaster surface of corridor and other permanent partitions and to the center of partitions that separate the premises from adjoining rentable areas.

No deduction should be made for vestibules inside the building line or for columns or projections necessary to the building. No addition should be made for bay windows extending outside the building line.

the building's service are measured, the same method should be used that is used in measuring rentable areas.

When owners and managers measure alike the only difference in rentable areas will be in the size of columns and amount of area occupied by projections due to variations in building material and style of architecture.

These standards will interest the architect because they are accepted by a large and important organization which has to do with the cost of operation

and maintenance of buildings. The architect must consider these factors which have such a great influence on the success of his design measured in terms of revenue and in the last analysis revenue is the thing which classifies the owner as the satisfied or dissatisfied client.

The owner who finds that his building produces a reduced revenue through faulty design will probably charge all his losses to the incompetence of his architect, even though the owner may have insisted on some of the radical faults himself. In order to fortify himself the architect must understand the controlling factors involved and be able to convince the owner that his judgment is based on known facts. These can be procured in several ways. It is, however, as legitimate and necessary for the architect or the owner to employ the services of an expert and successful building manager during the preparation of the plans, as it is to employ the mechanical or structural engineer. Such service will eliminate some of the features of arrangement and construction which too often reduces the real value of the building. Building management is a comparatively new profession, which has been developed as a result of the immense sums of money involved in office and commercial building investments. None can be more competent than those in contact with the actual details of management and as the work is now systematized the knowledge thus gained is available and of an exact nature.

School Lighting Comment

COMMENT has been received on the Code of Lighting School Buildings which was presented in THE AMERICAN ARCHITECT of Aug 21 and 28, 1918, from William B. Ittner. Concerning the natural lighting of such buildings, Mr. Ittner states that the code gives no real information and that he has never been in sympathy with state laws which require a given amount of glass area in relation to floor area. Quoting further:

"The proper lighting of class rooms is largely a matter of good judgment and cannot be restricted to any given rule which would cover all cases, as there is quite as much harm in too much as in too little light.

"Obviously, a glass area which would be proper in Northern or Eastern States would be entirely too much for schools in Central and Southern States. In some instances state regulations have been so drastic in this matter that special forms of window construction have to be used, notably steel sash and mullions. Even window muntins between panes of glass are prohibited on account of their supposed shadow casting qualities, all of which has resulted in increased cost without commensurate benefit.

"Then again, the proper lighting of a class room depends quite as much upon the color of its walls and ceiling as it does upon the window area. Again, a properly lighted class room can be absolutely ruined for effectiveness by the type of window shades adopted.

"In our work here in Saint Louis we have never adhered rigidly to any rule wherein glass area was proportioned to floor area, but have been guided more by the location of the school, its orientation, and the shadowing effects of surrounding buildings."

Codes that fix minimum requirements are necessary. This is because of the fact that the design and construction of buildings is not, at this time, confined to men having the training, ability, experience and judgment that Mr. Ittner possesses. It is true that no regulation of this kind can solve each individual problem, but as long as they are a necessity there must be a starting along these lines. It is unfortunate that codes too often specify details, as in the window construction mentioned, rather than the results to be attained. With a reasonably specified objective, the manner of accomplishment should be left to the judgment of the designer. The tendency at this time is to make the code a specifying of general results rather than detailed requirements. This simplification of regulations will enable architects to design their work, in many localities, to better advantage than at this time.

As to the inadequacy of the natural lighting portion of the code mentioned, it is largely due to the lack of working data pertaining to the subject. Appreciating this fact, the Illuminating Engineering Society has recently appointed a Committee on Sky Brightness, which will investigate and classify the sky brightness of the various sections of this country throughout the year, and its influence on interior illumination. With this data in hand, the designer of all classes of buildings will be able to use the source of natural light, sky brightness, to the proper solution of each individual problem. This data will also be of value in what has been recently termed sunlight engineering. The importance of this subject is becoming better appreciated in its application to city planning.

Industrial Information

Casement Window Hardware

The "right idea" in casement window hardware is discussed in the August issue of *Doorways,* the house organ of the Richards-Wilcox Mfg. Company, Aurora, Ill. It is said that the "air-way" fixture recently developed by that company embodies the best principles in window hardware for multiple casement sash; it affords perfect ventilation and light, closes weather tight and operates easily and positively. "Air-way" equipped windows open in, permitting of their being easily washed; eliminating interference with screens and storm windows, and precluding damage from their "banging in the wind," as the article states they might if they opened out.

This hardware, which is manufactured in stock sizes for windows with panes of various widths, consists of patented sash links which connect sash at top and bottom, and metal tracks for top and bottom guide; butts for sash adjacent to fixed jamb; a combination fastener and handle; brass chafing plates, rubber stops and safety locks. This hardware is available in three finishes: Solid brass, with brush brass finish; brass plated, with brush brass finish, and dull black imitation Bower-Barff.

It is stated in this booklet that the company has prepared a booklet illustrating and describing this product in full, and that there is also a book available dealing with overhead carrying systems for various purposes, which will be mailed without obligation to those requesting it. Information regarding the requirements of individual plants will also be supplied, it is stated.

Rex Asphalt Shingles

The Flintkote Company, 88 Pearl Street, Boston, Mass., has on the market several types of asphalt shingles. They include slate surfaced strip shingles, wide space shingles, slate surfaced; diamond strip shingles, shingle roll roofing and Rex slate surfaced roofing, made in two colors. The shingles themselves are available in three colors: Dark red, grayish green and mottled. Particularly fine effects can be obtained with the use of the mottled shingles; the color tones are softened and the variations gradual, while the broken line and deep shadow give an irregular outline slightly suggestive of the thatched roof. These materials are approved by the Underwriters' Laboratories and are guaranteed for ten years.

The Benjamin Two-way Plug

Double service from one electric light socket is offered by the Benjamin Electric Mfg. Company, 806 West Washington Street, Chicago. The two-way plug manufactured by this company fits any ordinary one-light socket and makes possible an extra electrical appliance in any room in the house. It helps one to get double value from his electricity, so the company's booklet states; makes possible light and heat from one socket, and is a great factor in "lightening the labor in the home."

One Pipe Heating

The one-pipe heater, manufactured by the International Heater Company, Utica, N. Y., can be used to advantage in many small residences. The system acts upon a principle which combines the furnace and the stove. The one-pipe heater is a device for heating the air and causing it to circulate through the rooms of a house. Hence it will be understood that open and simple planning must be involved where such a system is to be used. The warm air from the heater in the basement rises into one room on the first floor through a register; it is diffused from this room into the other rooms on that floor through open doorways and registers, and to the rooms on the upper floor through registers alone.

The system is easily and simply installed and is not prohibitive in first cost. Ample testimony from users which appears in the company's literature would lead to the belief that its use had been highly successful in many instances.